Report Prepared for the Research Division
Royal Commission on National Passenger Transportation

Canadian Ferry Costs and Industry Analysis

Geoplan Consultants Inc.
December 1991

RR-09

Opinions expressed are those of the authors and not necessarily those of the Royal Commission on National Passenger Transportation.

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EXECUTIVE SUMMARY

The Royal Commission on National Passenger Transportation retained Geoplan Consultants Inc. to undertake a project to develop uniform cost, revenue, and output measures for three major ferry operations within Canada. In general terms, the Commission wished to broaden its understanding of the ferry mode of travel by examining the similarities and differences among the operations of a federal Crown Corporation, a provincial Crown Corporation and a privately operated service. Marine Atlantic Inc., British Columbia Ferry Corporation, and Northumberland Ferries Ltd. have respectively been chosen as the firms to focus on for this examination.

In their roles as marine bridges between highway segments, ferry services provide transportation to freight and passenger movements simultaneously. A means of segregating cost elements for passenger and freight traffic was required. Cost allocation for the services analyzed are based on the amount of deck space occupied by respective traffic elements. The measure of passenger activity which has been used to calculate unit costs and unit revenues is the number of passenger vehicle kilometres provided by particular ferry services.

The key points derived from a consideration of cost elements among the three ferry service operators are:

- The cost per passenger vehicle kilometre (pvk) moved on ferry services varies widely among individual routes and particular operators. Both the highest ($11.11/pvk) and the lowest ($.57/pvk) cost routes are offered by BC Ferries.

- Passenger costs for the total of Marine Atlantic services ($1.98/pvk) are approximately double those of the BC Ferries system ($.91/pvk). Northumberland Ferries' costs are $2.28/pvk.

- The three Vancouver Island/Mainland (VI/M) services which effectively connect the heavily populated southern British Columbia mainland with the provincial capital and the remainder of southern Vancouver Island, dominate ferry passenger output within BC Ferries (80 percent of total pvk's produced). This service grouping alone provides 3.5 times more passenger activity than all of Marine Atlantic.

- Excluding the VI/M "super ferry service" grouping, BC Ferries system costs are $1.81/pvk which are very similar to costs experienced on the east coast;

- High cost east coast services such as Borden/Cape Tormentine ($2.82/pvk) and Yarmouth/Bar Harbor ($2.52/pvk) have relatively low annual capacity utilization factors The VI/M grouping, on the other hand, has an extremely high annual utilization of capacity. In general terms, B.C. Ferry services have higher load factors which are supported by a much more even seasonal distribution of traffic than that which occurs on the east coast;

- Labour wage rates for BC Ferries are an average of 11 percent higher than those of Marine Atlantic and 21 percent higher than those of Northumberland Ferries. Wage rates do not appear to be contributing to higher unit costs on the east coast;

- Operating conditions are much more benign west coast compared to eastern Canada. In addition to operating in an ice-free environment, general ambient conditions for most of BC Ferries' services are less harsh than those encountered by Marine Atlantic and Northumberland Ferries. This contributes to reduced vessel and shore infrastructure capital costs, as well as reduced operating and maintenance expenditures; and

- Administrative expenses at both Marine Atlantic and BC Ferries appear high relative to Northumberland Ferries. Some of the difference can be explained by the geographic coverage required for each of the larger corporations. As well, both Marine Atlantic and BC Ferries have reporting relationships, as Crown Corporations, not required by most private operators.

Once passenger unit revenues were developed, it was possible to examine cost recovery ratios between services and operators, and to comment upon potential areas of revenue enhancement. The principal conclusions apparent from this portion of the study are as follows:

- Revenue associated with the direct movement of passengers and vehicles is the dominant source of commercial revenue earned by all of the ferry service operators investigated;

- Similar to the situation evident in the costing analysis, there are considerable variances in unit revenue figures among services operating on the east and west coasts. Unlike costs, however, aggregate passenger unit revenues are very comparable between all three operators;

- Cost recovery ratios for passenger traffic services offered by Marine Atlantic range from .36 to .84, with a system wide average of .43 being recorded. Northumberland Ferries passenger cost recovery is .44;

- BC Ferries overall passenger cost recovery is .84. The VI/M group of services, however, has a cost recovery of 1.09 which effectively cross subsidizes the revenues obtained from other services. The non VI/M services have a cost recovery of .46.

- Break even revenue levels for most east and west coast services are approximately double those of existing levels;

- Ferry rates are a high profile issue in all of the jurisdictions where they operate. Substantive increases can be expected to draw a great deal of attention;

- Large passenger rate increases will be met with a decline in demand, thereby making cost recovery more difficult to achieve;

- Substantive revenue enhancement could be expected by a broader application of peak season pricing on east coast services. In addition, development of new ancillary revenue sources such as gaming machines could provide increased revenue to all services;

- Passenger traffic appears to be contributing more to cost recovery than freight traffic on several east coast services.

Because of the considerable difference between the operating and traffic conditions experienced by Marine Atlantic and BC Ferries, a hypothetical comparison between Marine Atlantic's Borden to Cape Tormentine ferry service and BC Ferries' Tsawwassen to Swartz Bay service was developed. A hypothetical cost and revenue structure was developed for the Borden to Cape Tormentine crossing to simulate west coast traffic and operating conditions. This comparison showed that the Borden to Cape Tormentine cost recovery ratio would be considerably enhanced from its existing levels if it experienced conditions similar to those present on the Tsawwassen to Swartz Bay service.

The final section of the report briefly reviews conventional and high-speed ferry vessel technology. It concludes that future vessel developments will emphasize on-board amenities, flexibility of deployment and adherence to a variety of regulations. High-speed ferries will replace conventional vessels on some routes, and new routes will likely be opened by these technically innovative vessels.

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

The Royal Commission on National Passenger Transportation retained Geoplan Consultants Inc. to undertake "An Examination of Canadian Ferry Costs and Industry Analysis." A broad range of basic operating statistics for particular ferry services and operators is presented prior to the development of cost and revenue comparisons. A background statement on the role of ferry services in Canada is contained below.

1.2 Background

With the longest coast line in the world and with major island groupings located in temperate climatic zones, marine transportation systems have been crucial to Canada's formation and development. Sparse populations and expansive land masses support similar statements being made for other major transportation modes in this country. It is evident then that the role of transportation in Canadian affairs is more significant than most other nations.

In recognition of transportation's historical, existing, and continuing role, the Royal Commission on National Passenger Transportation was established to undertake a comprehensive assessment of passenger travel within this country. A series of modal assessments are being undertaken to analyze all of the components of the Canadian passenger system. The focus of this particular report is an intermodal conveyance called the ferry service, which effectively combines land and marine based transportation movements. Ferry services provide marine bridges for land based traffic which is able to continue unimpeded after a sea voyage. Because of both land and marine based operating influences, ferry services are frequently considered as an independent mode of travel.

Figure 1.1 has been prepared to illustrate the locations of major ferry operations which are the subject of this study. As one can see, the operations are resident on both east and west coasts. Without them, surface based travel to the Provinces of Newfoundland and Prince Edward Island and to Vancouver Island would not be possible. It is not surprising therefore that formation, or maintenance, of ferry and shipping services are mentioned in the Terms of Union between Canada and the Provinces of British Columbia, Prince Edward Island and Newfoundland. In capsule form, these obligations are as follows:

- Canada agreed to provide British Columbia with an efficient steamship service between Victoria and the northwestern United States and to adapt these vessels for conveyance of freight and passengers;

- Canada agreed to provide Prince Edward Island with an efficient and continuous steamship service for the movement of mail and passengers;

- Canada agreed to provide a freight and passenger steamship service, which ultimately would allow for the conveyance of motor vehicles, between North Sydney and Port aux Basques.

Figure 1.1: Canadian Ferry Operations Under Study

The purpose of this report is to describe east and west coast ferry activities by concentrating on three major ferry operators. The first operator chosen for consideration is Marine Atlantic Inc. With a head office in Moncton, New Brunswick, this federal Crown Corporation operates ferry services within and between Canada's Atlantic Provinces. Included amongst the services provided by Marine Atlantic Inc. are the constitutional obligations to Prince Edward Island and Newfoundland. The second operator is a Charlottetown based private company, Northumberland Ferries Limited, which operates a seasonal service between Prince Edward Island and Nova Scotia. The third, and largest, ferry operator under consideration is British Columbia Ferry Corporation or BC Ferries. This provincial Crown Corporation operates twenty four individual services throughout British Columbia from a head office in Victoria.

The services provided by each of these corporate entities will be described in individual chapters which follow.

2.0 MARINE ATLANTIC INC.

2.1 Corporate History, Mandate, and Operating Parameters

The Canadian National Railway began to provide ferry services in eastern Canada during 1919. As a formal attempt to distinguish ferry activities from other railway activities , CN established an East Coast Marine and Ferry Services Department in 1973. The evolution continued with the establishment of CN Marine as a wholly owned subsidiary of the railway company in 1977.

The most recent organizational step occurred in 1986 with the passage of the Marine Atlantic Inc. Acquisition Authorization Act. CN Marine was renamed Marine Atlantic Inc. and established as a separate Crown Corporation.

The Act establishing Marine Atlantic Inc. as a Crown Corporation included the following mandate for the new company:

> "Acquisition, establishment, management and operation of a marine transportation service, a marine maintenance, repair and refit service, a marine construction business and any service or business related thereto."

As a Crown Corporation, Marine Atlantic Inc. is subject to the financial management and control provisions of the Financial Administration Act (F.A.A) which specifies, among other things, the preparation of corporate plans and budgets. These are annually submitted to the Minister of Transport and upon his recommendation to the Governor in Council for final approval.

In addition to the control provisions of the F.A.A., Marine Atlantic Inc. additionally signs annual operating and capital agreements with Transport Canada which define:

- operating plans
- levels of service for individual crossings;
- anticipated traffic demand;
- rate levels;
- a schedule of subsidy payments;
- reporting formats; and
- capital items to be funded.

For the purposes of the Financial Administration Act., Marine Atlantic Inc. has been designated as a dependent Crown Corporation and placed in Part I of Schedule III. This designation denotes that the Company is ordinarily dependent on funding from the Government of Canada.

2.2 Services Provided

Marine Atlantic Inc. provides six primary ferry services within Atlantic Canada (please see Figure 2.1). Two of these; the North Sydney to Port aux Basques crossing, and the Cape Tormentine to Borden crossing, represent Canada's constitutional commitments to Newfoundland and Prince Edward Island, respectively. The Newfoundland Coastal Service connects isolated ports in Labrador and on the Island with major centres, and the North Sydney to Argentia service connects Newfoundland's Avalon Peninsula with the mainland during the June to September period. Marine Atlantic Inc. also operates two services in the Bay of Fundy; Saint John to Digby, and Yarmouth to Bar Harbor, Maine. A detailed description of each of these services, including traffic carryings, follows.

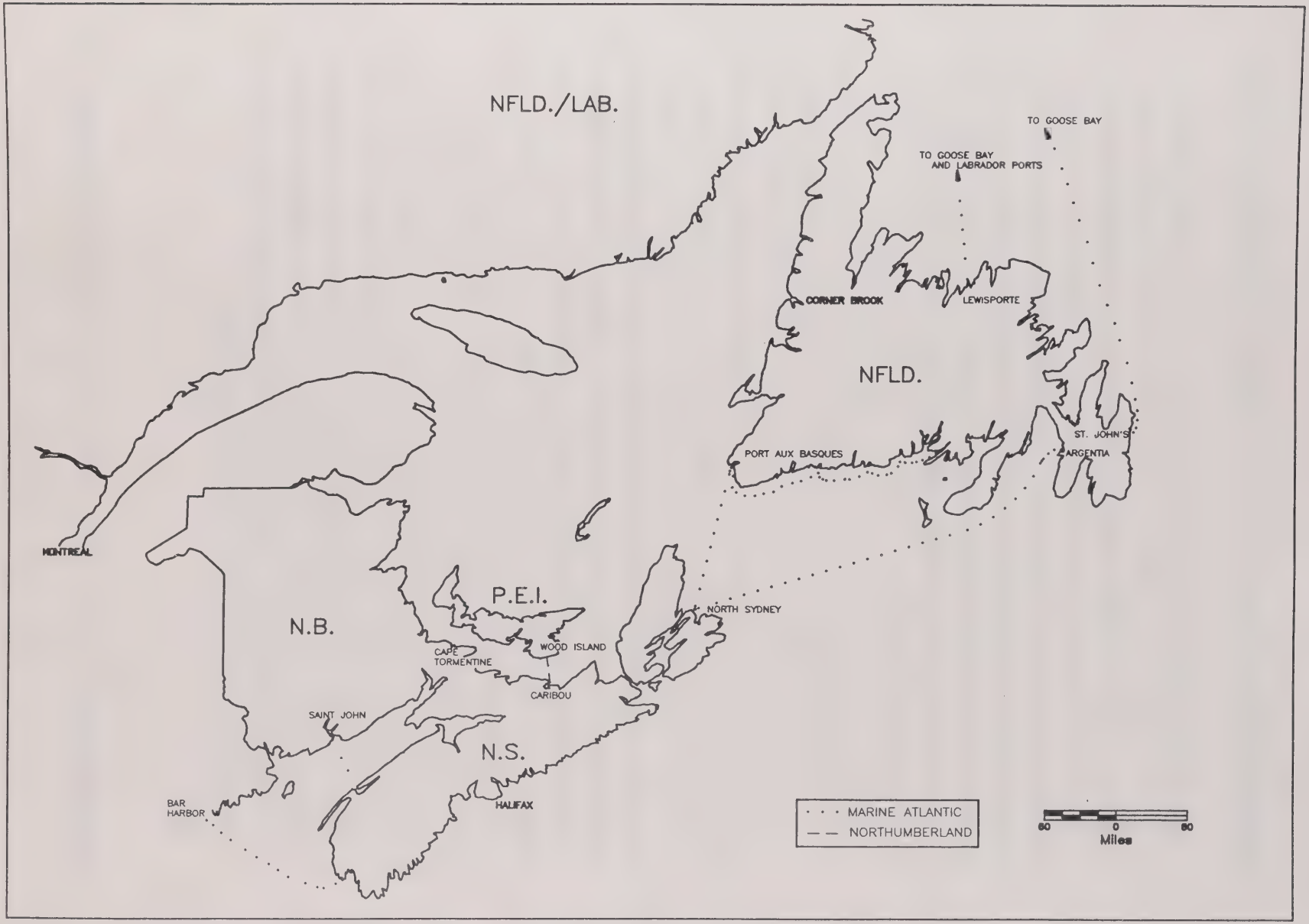


FIGURE 2.1: MAJOR ATLANTIC CANADIAN FERRY ROUTES

2.2.1 North Sydney to Port aux Basques

As noted previously the precise terminal locations for this service were explicitly stated in the Terms of Union between Canada and Newfoundland. This follows from the fact that the Newfoundland Railway was already operating a marine service between these two locations. The 178 kilometre crossing has become the main entry point for passenger and commercial vehicles entering and leaving Newfoundland. An extensive terminal building and yard complex has been constructed at both North Sydney and Port aux Basques to handle the various forms of traffic offering for this service.

Reference to Table 2.1 illustrates that, despite carrying over 360,000 passengers and 117,000 passenger auto equivalents annually, this service has a definite freight bias. As measured in auto equivalent units, over 60 per cent of deck space demand can be traced to commercial traffic. A total of 61,000 commercial units including tractor trailers, drop trailers, straight trucks and containers moved on this crossing in 1990.

Notwithstanding the role of freight in annual activity, the North Sydney to Port aux Basques service is also the principal passenger entry/exit point for surface based traffic. An extremely high percentage (48.2%) of this travel occurs during the peak summer months of July and August. This effectively translates into monthly peak season demand of 87,000 passengers and 28,000 passenger auto equivalents. Virtually all of the summer travellers are on vacation or visiting friends and relatives with only about 5 percent reporting a business trip purpose.

A one way fare for a vehicle and driver for this crossing was $57.75 in the 1990 operating year. In terms of dollars per kilometre of travel, the fare amounts to $.32/km. Rates for this service and for other subsidized east coast services are approved annually by the Minister of Transport. For the past decade, targets for rate increases have generally been in the range of anticipated inflation plus 1-2 percent. Some flexibility to apply market based increases has generally been given to the operator. During the peak season,

passenger sailings from each terminal generally occur twice daily, with three crossings available on Monday and four on Sunday. The increased sailings on Sunday and Monday are as a consequence of a vessel sharing arrangement with the North Sydney to Argentia service.

The North Sydney to Port aux Basques crossing is subject to severe weather conditions, particularly during the period from late fall to early spring. This coincides with the occurrence of storms travelling along the eastern seaboard from the southwest to northeast. In addition, ice flows leaving the Gulf of St. Lawrence during the spring present navigational hazards for much of the crossing and are particularly troublesome on the Cape Breton shore. It is not unusual for service disruptions of several days to occur during this period, although this situation has improved considerably with the assignment of the two new "Ice Class I A Super" vessels to the service.

While detailed traffic statistics are contained in Appendix A of this report, it is worthwhile to point out the considerable turbulence that the freight side of the service has experienced during the past five years. In the early 1980's a Newfoundland Railway (TerraTransport) revitalization scheme was implemented. Several thousand containers were purchased and distribution centres were established on the Island of Newfoundland. The objective of this process was to enhance delivery of rail related traffic compared to conventional railcar service. After meeting with initial success, competition with direct water carriers from Halifax and Montreal and a decision to abandon the railcar service altogether, has resulted in a considerable reduction in this traffic element. For instance total containers moved in 1990 amounted to 5,033 units compared to 26,644 units carried in 1986. As railcar and container traffic has declined, truck traffic has grown at an annual compound growth rate of 4.3 percent. On the passenger side relatively steady growth has occurred over the 1986-1990 period. Generally speaking passenger and passenger vehicle increases have been in the 3-5 percent per annum range.

Table 2.1
Marine Atlantic Inc. Ferry Service Description
1990 Traffic Statistics

Service	Provincial Connection	Crossing Distance (km)	Sailing Time (hrs)	Volume Passengers	Volume Vehicles (auto equiv)	Passenger Vehicles			Commercial Vehicle		1-Way Fare Auto & Driver	Fare/km Auto & Driver
						Volume (auto equiv)	% of Total	% of Total during Peak	Volume (auto equiv)	% of Total		
North Sydney to Port aux Basques	NS - NFLD	178	5 - 6	362,350	315,436	117,598	37.3%	48.2%	197,838	62.7%	$57.75	$0.32
Newfoundland Coastal	NFLD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
North Sydney to Argentia	NS - NFLD	519	13	44,486	17,935	16,741	93.3%	64.5%	1,194	6.7%	$131.75	$0.25
Cape Tormentine to Borden	NB - PEI	15	0.75	1,791,286	1,234,944	697,286	56.5%	37.8%	537,658	43.5%	$10.00	$0.67
Saint John to Digby	NB - NS	70	2.5 - 3	213,667	130,315	63,070	48.4%	43.1%	67,245	51.6%	$69.25*	$0.99
Yarmouth to Bar Harbour	NS - ME	185	6	116,067	48,759	37,902	77.7%	55.1%	10,857	22.3%	$103.25*	$0.56

* Peak Seasonal Rates

2.2.2 Newfoundland Coastal Service

The Newfoundland Coastal service is really a series of services which are designed to provide access to a number of remote communities in southern Newfoundland and along the coast of Labrador. Elements included in this service are: a conventional ferry service from Lewisporte to Goose Bay, a container service from St. John's to Goose Bay, medium speed passenger vessels on the Newfoundland South Coast, joint passenger/freight vessels on the South Coast and to Labrador, and dedicated freight vessels to the South Coast and Labrador as well. Because of the complexity of this service it would require a considerable effort to isolate passenger and freight activity components.

In the years since Confederation, as highway access has been improved throughout the Island and parts of extreme Southern Labrador, a number of previously isolated Coastal service port communities have become connected to the provincial roadway network. With the exception of certain terminal locations, this has resulted in a cessation of coastal boat services to these communities. For the most part, coastal service ports are relatively small and are reliant upon seasonal inshore fishing activities for economic stimulus. All services to Labrador are on an "ice conditions permitting" basis only and generally operate in the June to late November time period.

2.2.3 North Sydney to Argentia

This service is now provided on a twice weekly schedule and during the 1986-1990 period has operated from late June to early September. Until 1990 and the arrival of the Smallwood, the service operated three times a week. In 1990 the service was reduced to twice weekly but overall capacity offered was doubled. During the 1991 operating season the schedule has been extended to an early June to late October period. The North Sydney to Argentia crossing essentially provides those with an Avalon Peninsula origin/destination, an opportunity to trade automobile driving time for ferry passage time. While this has an element of appeal during the months of July and August, difficulty in developing fringe season demand has been present.

As one may gather from the information contained in Table 2.1 virtually all of the traffic offering for this service is passenger related. In 1990, over 44,000 passengers and 17,000 passenger auto equivalents utilized this connection. A one way fare for a vehicle and its driver was $131.75 in 1990 which translates to $.25 per kilometre of crossing distance. A family of four making this crossing in both directions, with a vehicle, however, would be faced with a total transportation bill of $417.50 (provided children were 5-12 years of age). The long sea crossing of 13 hours also stimulates demand for cabin space and recliner chairs which can be obtained for additional charges.

Despite the rather steep charges for this crossing, additional summertime capacity was believed necessary. This was accomplished in 1990 with the introduction of the M.V. Joseph and Clara Smallwood. As can be gleaned from the traffic statistics contained in the appendix, passenger demand grew considerably with the arrival of the new vessel. When not operating on the Argentia crossing, the Smallwood is utilized on the North Sydney to Port aux Basques service.

2.2.4 Cape Tormentine to Borden

The provision of an efficient steamship service to maintain a continuous link with the mainland was one of the obligations made by Canada to Prince Edward Island, when the latter joined the federation in 1873. The Cape Tormentine to Borden crossing is the fulfilment of that commitment.

Traffic levels on this crossing represent about three quarters of all passenger activity and two thirds of all freight activity handled in the Marine Atlantic system. Passenger activity on an auto equivalent basis represents 56.5 percent of traffic using this service. There is a distinctive summer peaking of passenger traffic but this is less pronounced than for other Marine Atlantic services. Part of the reason for a flatter summer peak is the presence of a private seasonal operation which connects Prince Edward Island with Nova Scotia. This service will be discussed in a separate chapter. Auto exit studies and other independent

sources confirm that the bulk of summer visitors to Prince Edward Island are from Nova Scotia and New Brunswick but sizable representation from the central Canadian Provinces of Ontario and Quebec also occurs.

Freight movements have been affected by a railway abandonment process similar to that which occurred in Newfoundland. Railcar movements to Prince Edward Island ceased altogether in 1990, although rapid declines had been occurring for a number of years. With the diversion of railcar traffic to the highway, a five year compound growth rate of 10.2 percent in the number of tractor trailers using this service has taken place. Freight activity is dominated by the production and shipment of potatoes. Agricultural inputs such as fertilizers and lime travel to Prince Edward Island while potatoes are the principal outbound commodity. The impact of increased on Island potato processing or the recent difficulties with the PVYN virus are not reflected in these numbers.

Two very efficient, non ice strengthened vessels, the Holiday Island and the Vacationland provide the mainstay of service from the late spring to late fall periods. Winter service and peak season overflow capacity are principally handled by the M.V. Abegweit. Additional winter service is provided by the John Hamilton Gray. Scheduled summer service basically occurs every hour from each terminal during most of the day. The minimum frequency for winter time sailings increases to one and one half hours. Service interruptions are caused by storm force winds during the late fall to early spring period and ice flows in Northumberland Strait slow vessel passage during the mid spring.

The rate for a passenger automobile and driver was $10.00 in 1990. This equates to approximately $.67 per kilometre of voyage. As with other Marine Atlantic services, annual increments in rates, equivalent to estimated inflation plus one or two percentage points, have been achieved during the past decade. The future of this service is very much dependent upon upcoming decisions relating to the building of a fixed crossing across Northumberland Strait. If a fixed crossing is constructed, the rationale for continuance of this service ceases.

2.2.5 Saint John to Digby

This 70 kilometre crossing joins the largest city in New Brunswick with Nova Scotia's Annapolis Valley and can provide a considerable time saving for those wishing to travel between southwestern New Brunswick and southwestern Nova Scotia. For several decades prior to the assumption of this service by Marine Atlantic (CN Marine) in 1976, the Canadian Pacific Railway operated this crossing.

Activity on this service is almost split evenly between passengers and freight elements, with approximately 63,000 passenger auto equivalents and 67,000 freight auto equivalents being transported in 1990. Peak season passenger movements are quite pronounced. Over 43 percent of total passenger traffic is moved during July and August.

Using a peak season fare, which is 10 percent higher than off-season rates, the one-way passage for a vehicle and driver was $69.25 in 1990. Given the sailing distance of 70 kilometres, this produces a charge of $.99 per kilometre of crossing distance. The Saint John Digby service passenger fares are therefore the steepest in the Marine Atlantic system.

Traffic volumes during the 1986-1990 period have registered declines in virtually all passenger and freight categories. Compound annual declines for passenger vehicles are .8 percent while total commercial vehicles have produced annual declines of approximately four percent. In addition to normal economic factors, the principal determinants of demand for both passenger and commercial traffic is the comparative time and costs of making one's trip on existing highway connections. It would appear that advantages of using this service are seen to be less attractive.

The Bay of Fundy is ice free year round. It does experience the brunt of Atlantic coastal storms whose frequency peaks from late fall to early spring. In addition, the waters of the Bay are relatively cold which cause, sometimes prolonged, sea fog. Only the occurrence of high winds however, interrupt the offering of this service.

2.2.6 Yarmouth to Bar Harbor

This is the only international crossing in the Marine Atlantic system and as such provides a very popular avenue for United States visitors to enter southwestern Nova Scotia. In addition, the extremely important fishing industry of Southwestern Nova Scotia is afforded a non-highway alternative to ship their products closer to the Boston fish market.

This service has been in existence since 1956 and, as illustrated in Table 2.1, is primarily a passenger oriented crossing. Over three quarters of annual deck space demand can be traced to the passenger sector. Furthermore peak season passenger travel is significantly pronounced with over 55 percent occurring during July and August. Passage for a vehicle and driver on the six-hour crossing is $103.25 in the peak summer season. Per kilometre of sailing distance, the $.56 charge, is the third most expensive service offered by Marine Atlantic Inc.

Over the 1986-1990 period passenger traffic has stagnated at levels of approximately 118,000 people and 36,000 vehicles. Commercial units have shown steady declines, at an annual compound rate of close to 3 percent. Both the depressed economic atmosphere in the northeastern United States, which has affected tourism travel, and shrinkage of the Nova Scotian fishery are thought to contribute to the relatively poor traffic performance of this service.

During the peak summer operating period from late June to late September daily crossings of the Bay are made with the vessel overnighting in Bar Harbor. Outside of the summer peak, the service reduces to a thrice weekly schedule. It should also be noted that another privately run ferry service runs from Yarmouth to Portland, Maine from mid-May to mid-October.

2.3 Financial Parameters

Key Marine Atlantic Inc. financial data is illustrated in Table 2.2. In current dollar terms, expenses have risen from $195.6 million in 1986 to $219.5 million in 1990 which equates to an annual compound growth rate of approximately 2.9 percent. It should be noted that depreciation has been included in the expense category and under government contributions to revenue. In reality, the federal government funds the Marine Atlantic capital program directly. It is unlikely therefore that, on a year to year basis, depreciation and actual government capital transfers will be identical. The statement of depreciation in Table 2.2 illustrates a reasonable cost of capital which can be applied, and compared, to other service operators.

On the revenue side, those items which can be associated directly with traffic, and the patronization of on vessel services, have grown from $56.0 million in 1986 to $71.3 million in 1990 for an annual growth rate of 6.2 percent. Government contract revenues, that is subsidies for the provision of specific operating and non operating activities, have declined from a level of $123.0 million in 1986 to $120.0 million in 1990. The allocation for depreciation has risen sharply from $15.9 million to $25.6 million. This is reflective of two new large vessels having been added on the Nova Scotia to Newfoundland services.

If one examines transportation revenue as a percentage of total expenses over the 1986 to 1990 study period, a definite improvement in the percentage of costs covered by fare box revenue is revealed. Transportation revenue amounted to 28.6 percent of total costs in 1986. This ratio has grown to 32.5 percent in 1990. Not surprisingly, in real, or 1990 constant dollar terms, total federal support (including the allowance for depreciation) for Marine Atlantic services has declined to $146.5 million in 1990 from a level of $165.9 million in 1986 ($138.8 million in current $'s).

Table 2.2
Marine Atlantic Inc.
Income/Expense Information
($'000's)

	1986	1987	1988	1989	1990
Revenues					
Transportation	$41,365	$46,026	$49,634	$52,094	$55,679
Vessel Services	$9,590	$10,276	$10,671	$11,641	$11,966
Miscellaneous	$5,088	$5,673	$5,440	$4,045	$3,645
Subtotal	$56,043	$61,975	$65,746	$67,780	$71,290
Government Contract	$122,966	$115,014	$119,200	$118,800	$120,000
Government for Depreciation*	$15,874	$20,363	$20,225	$20,358	$25,629
Other	-	-	-	$3,524	$897
Subtotal, Government	$138,840	$135,377	$139,425	$142,682	$146,526
Total	$194,883	$197,352	$205,171	$210,462	$217,816
Expenses					
Terminal Operations	$32,712	$33,326	$32,321	$31,579	$29,911
Terminal Maintenance	$10,223	$10,024	$9,826	$9,891	$9,257
Vessel Operations	$87,263	$82,400	$85,636	$92,986	$93,618
Vessel Maintenance	$16,896	$18,571	$22,027	$21,601	$23,386
Vessel Services	$2,948	$3,031	$3,518	$3,565	$3,803
Marine Shore	$4,418	$4,661	$4,113	$3,959	$4,248
Service Management	$4,039	$4,493	$4,220	$4,338	$3,979
Total Operating Expenses	$158,499	$156,506	$161,661	$167,918	$168,203
Non-Operating Expenses	$21,254	$19,218	$22,379	$20,795	$24,763
Depreciation	$15,874	$20,363	$20,225	$20,358	$25,629
Other	-	-	-	$3,524	$897
Total Expenses	$195,627	$196,087	$204,265	$212,595	$219,492
Other Expense Adjustments	($1,744)	($2,024)	($1,501)	($1,385)	($1,743)
Net Income	$1,000	$3,289	$2,407	($748)	$67

* The government funds capital requirements directly. Depreciation is shown to reflect a capital cost on the assumption that depreciation, in the long run, will be equal to capital advances.

On the expense side, the single biggest growth item is that related to depreciation. Total operating expense items have grown at a level of slightly less than 2 percent per year. Management costs have increased at approximately 3.9 percent annually but again this is below the rate of inflation over the same period.

2.3.1 North Sydney to Port aux Basques

Service specific revenue and expense figures are included in Table 2.3. On a service basis, expenses related to corporate management activities (non operating expenses) and depreciation have not been included. In addition, for presentation purposes, the information in the table is for the 1986, 1988 and 1990 operating years only.

The most costly service provided by Marine Atlantic is the constitutional commitment to Newfoundland, the North Sydney to Port aux Basques crossing. In 1990, direct operating expenses were $64.5 million. This compares very favourably with direct operating expenses of $73.3 million in 1986. Commercial revenues have grown from $22.6 million to $27.5 million over the same period. Expenses have been reduced by the introduction of a streamlined three vessel service configuration. Unfortunately, the sizable reductions in commercial traffic in this service, that were discussed earlier, have also impacted upon the growth of transportation revenue which actually declined between 1988 and 1990.

2.3.2 Newfoundland Coastal Service

As a percentage of operating costs, the most subsidized of all Marine Atlantic services is the Newfoundland Coastal service. Commercial revenues accounted for only 17.7 percent of direct operating expenses in 1990. Compared to 1986 however, when only 13.4 percent of costs were covered, some improvements have been registered. An inspection of data in Table 2.3 shows revenue growth on this service at an annual compound rate of 12.3 percent. This has considerably exceeded the growth in direct operating costs of 4.9 percent per annum.

Table 2.3
Marine Atlantic Financial Information by Service*
($'000's)

Revenues and Expenses	North Sydney Port aux Basques			Newfoundland Coastal			North Sydney Argentia			Cape Tormentine Borden			Saint John Digby			Yarmouth Bar Harbour		
	1986	1988	1990	1986	1988	1990	1986	1988	1990	1986	1988	1990	1986	1988	1990	1986	1988	1990
Commercial Revenue																		
Transportation	$16,279	$20,550	$20,975	$2,895	$4,000	$4,662	$1,571	$1,221	$3,151	$8,035	$9,793	$11,916	$7,034	$7,751	$8,569	$5,549	$6,319	$6,405
Vessel Services	$3,202	$3,994	$4,517	$489	$630	$636	$845	$675	$1,213	$2,164	$2,548	$2,854	$358	$368	$412	$2,532	$2,456	$2,334
Miscellaneous	$3,162	$3,727	$2,054	$75	$289	$211	$10	$8	$35	$43	$43	$53	$116	$126	$135	$1,683	$1,247	$1,156
Total Commercial	$22,643	$28,271	$27,547	$3,459	$4,919	$5,509	$2,426	$1,904	$4,399	$10,242	$12,384	$14,823	$7,508	$8,245	$9,116	$9,764	$10,022	$9,895
Total Gov't Contract	$49,873	$37,872	$35,988	$22,277	$24,972	$27,353	$4,430	$4,672	$1,367	$21,340	$22,465	$22,674	$3,641	$3,238	$2,979	$1,947	$4,634	$5,978
Total Revenue	$72,516	$66,143	$63,535	$25,736	$29,891	$32,862	$6,856	$6,576	$5,766	$31,582	$34,849	$37,497	$11,149	$11,483	$12,095	$11,711	$14,656	$15,873
Expenses																		
Terminal Operations	$21,065	$19,251	$16,232	$3,876	$4,769	$4,972	$388	$447	$526	$3,636	$3,692	$3,678	$2,297	$2,571	$2,830	$1,451	$1,591	$1,672
Terminal Maintenance	$6,352	$5,767	$4,937	$735	$796	$963	$50	$67	$24	$2,285	$2,353	$2,415	$424	$412	$466	$376	$457	$453
Vessel Operations	$36,091	$28,742	$30,943	$16,290	$18,726	$19,595	$3,539	$2,944	$3,861	$17,713	$19,906	$21,905	$6,913	$7,055	$7,696	$6,717	$8,262	$9,619
Vessel Maintenance	$5,344	$6,756	$7,692	$3,211	$4,663	$3,927	$1,501	$1,817	$1,717	$4,506	$4,837	$5,359	$566	$625	$649	$1,768	$3,329	$4,042
Vessel Services	$1,088	$1,463	$1,469	$163	$154	$247	$239	$263	$362	$590	$808	$943	$105	$79	$81	$762	$750	$702
Marine Shore	$1,628	$1,355	$1,373	$554	$509	$433	$147	$104	$131	$1,666	$1,715	$1,731	$211	$195	$198	$211	$235	$381
Service Management	$1,694	$1,789	$1,817	$988	$1,050	$1,065	$141	$158	$151	$668	$676	$520	$243	$246	$188	$304	$307	$237
Total Expenses	$73,262	$65,123	$64,462	$25,817	$30,667	$31,202	$6,005	$5,800	$6,772	$31,064	$33,987	$36,551	$10,759	$11,183	$12,108	$11,589	$14,931	$17,106
Operating Income	($746)	$1,020	($927)	($81)	($776)	$1,660	$851	$776	($1,006)	$518	$862	$946	$390	$300	($13)	$122	($275)	($1,233)
Commercial Revenue / Total Expenses	30.9%	43.4%	42.7%	13.4%	16.0%	17.7%	40.4%	32.8%	65.0%	33.0%	36.4%	40.6%	69.8%	73.7%	75.3%	84.3%	67.1%	57.8%

* Expenses related to head office, depreciation and cost of capital are not included in these service allocations.

The nature of the Newfoundland coastal communities which are essentially isolated and dependent upon seasonal fishing activities for their livelihood makes enhanced cost recovery a difficult prospect.

2.3.3 North Sydney to Argentia

The extended operating season and the introduction of a larger capacity vessel that occurred in 1990, fostered considerable revenue growth on this service. Aggregate commercial revenues in 1990 leaped to $4.4 million from a level of $2.7 million and $1.9 million in 1989 and 1988 respectively. Overall direct operating costs rose slightly from $6.0 million in 1986 to $6.8 million in 1990. As a consequence of much greater revenue and modest cost increases, direct cost recovery from commercial revenues grew from 40.3 percent in 1986 to 65.0 percent in 1990.

2.3.4 Cape Tormentine to Borden

The constitutionally designated service to Prince Edward Island has total direct operating costs of $36.5 million in 1990. This figure has grown slightly from a value of $31.1 million in 1986. The 4.2 percent growth in costs has been greatly exceeded by an 9.7 percent annual increase in commercial revenues. The net result of the divergent rates of growth in revenues and expenditures has been an improvement in the direct cost recovery ratio from a level of 33 percent in 1986 to approximately 40.6 percent in 1990.

2.3.5 Saint John to Digby

This service achieved the highest level of direct cost recovery in the Marine Atlantic system during 1990. Commercial revenues were slightly in excess of 75 percent of direct operating costs. During the 1986 to 1990 period annual commercial revenue growth has been 60 percent higher than operating costs. It will be recalled that declines were experienced in almost all traffic categories using this service during the study period. Given the availability

of a highway alternative for the traffic that takes the Saint John to Digby service, there may be limited revenue enhancement capability remaining on the crossing.

2.3.6 Yarmouth to Bar Harbor

Transportation revenue growth on this service has been virtually non existent over the study period. Commercial revenue amounted to $9.7 million in 1986 and was only $9.9 million in 1990. Significant declines in truck carryings and some erosion in passenger traffic have contributed to the weak revenue performance. A reduction in currency exchange benefits has also occurred during this time period.

Vessel operating expenses have also increased markedly. This follows from the addition of a third weekly crossing in 1987 for the winter operating season. Vessel maintenance figures appear to have grown astronomically during the study period. It should be noted however, the M.V. Bluenose is subject to a biennial refit. Vessel maintenance figures for 1987 and 1989 were $1.045 million and $.973 million respectively. While direct cost recovery declined from 84.3 percent in 1986 to 57.8 percent in 1990, the latter number is somewhat skewed by the high biennial refit costs. The direct cost recovery ratio was 82.0 percent in 1989.

2.4 Capacity Utilization

The determination of a load factor, or utilization ratio, by service is not normally prepared by Marine Atlantic Inc. Based on total estimated auto equivalents carried, and the approximate amount of capacity provided on each service, the following utilization ratios have been determined:

- North Sydney to Port aux Basques - 57.5 percent
- North Sydney to Argentia - 62.0 percent
- Cape Tormentine to Borden - 52.3 percent
- Saint John to Digby - 59.6 percent
- Yarmouth to Bar Harbor - 47.2 percent

It should be noted that load factors vary widely during the year. Peak summer months typically have load factors of 80 to 90 percent. Marine Atlantic does have a reservation system however, for all services except the Borden to Tormentine crossing.

2.5 Summary and Future Direction

Marine Atlantic Inc. offers a diverse range of services. Of its six major routes each has distinct markets and operating environments. In general terms, during the past 5 years some progress has been made in the enhancements of cost recovery ratios.

The future of Marine Atlantic will be influenced by such factors as:

- a fixed crossing to Prince Edward Island;
- the need for winter capacity to Prince Edward Island;
- the extension of the Argentia ferry schedule;
- aging Bay of Fundy vessels;
- new high speed ferry technology;
- decreased federal funding;
- coastal service rationalization and enhancements; and
- Montreal/Halifax to Newfoundland freight schedules and capacities.

3.0 NORTHUMBERLAND FERRIES LTD.

3.1 Corporate History and Operating Parameters

Shipping services between southeastern Prince Edward Island and the Pictou area of Nova Scotia have been operating for almost a century. In 1937 a delegation from Prince Edward Island approached the federal government with a proposal that an automobile ferry should be operated between Wood Islands, P.E.I. and Caribou, N.S. (please refer to Figure 2.1). The federal government agreed to subsidize such a service for an amount of $30,000 per year. A company called Northumberland Ferries Ltd. assumed operation of the service in 1941 and has continued as the operator for the past 50 years.

In exchange for an annual operating subsidy Transport Canada and Northumberland Ferries signed an operating agreement which allows the federal government to establish:

- rates to be charged;
- anticipated traffic levels;
- the level of service to be provided;
- a schedule of subsidy payments; and
- reporting formats for financial and traffic data.

The company owns one of the four vessels on this route. The other three vessels and the terminal facilities are owned by Transport Canada. The operating contracts have a management allowance which permits the operator to retain 100 percent of a fixed sum of excess revenue. As excess revenue increases, the retention ratio eventually declines to 15 percent.

3.2 Service Profile

The approach channel to the Caribou terminal is both shallow and narrow. Transport Canada Coast Guard staff mark the channel each spring after ice has departed the area. Navigational aids are removed in mid December before ice conditions can sever their moorings. The placement and removal of channel markers essentially defines the operating periods available to this service. A normal season is from late April to the middle of December.

While loading priorities are given to commercial vehicles, and particularly those with livestock or perishable goods on board, the majority of traffic handled is associated with the movement of passengers. In terms of auto equivalent utilization (Table 3.1) approximately 71 percent is passenger related traffic. The four vessels that are employed on this crossing are an average of 26 years of age and have an average capacity of 60 auto equivalents. During the peak summer months, there is little opportunity to increase capacity with the existing fleet. Some additional capacity can be added during the shoulder seasons. In 1988, in an effort to assist in the movement of spring and fall truck movements, the number of shoulder season crossings was increased. This has resulted in overall truck demand increasing at an annual compound growth rate of approximately 6.1 percent. Little or no growth has occurred in passenger traffic during the study period.

The one way fare for passenger and driver in 1990 amounted to $14.75. Per kilometre of crossing distance, this translates into $.67. This is identical to the per kilometre charge on the Borden Cape Tormentine service. Transport Canada have ensured that the rate schedule at this location is proportional to the respective crossing distance involved. Both the Borden-Tormentine and Wood Islands-Caribou services have implemented a one way ticketing procedure in 1991. Traffic is not charged to enter the Island but the one way fare is doubled

Table 3.1
Northumberland Ferries Ltd.
Wood Islands to Caribou
Five Year Traffic Profile, 1986 – 1990

Traffic	1986	1987	1988	1989	1990	4–Yr Compound Growth Rate
Passenger Traffic						
Passengers	530,095	538,591	551,555	548,563	529,385	–
Automobiles	156,350	155,623	162,989	163,253	159,434	0.5%
Pick–up Trucks	15,062	16,650	17,771	17,846	17,023	3.1%
Auto Trailers	7,806	7,739	7,295	7,059	6,124	–5.9%
Campers	6,595	7,498	7,343	6,749	6,096	–1.9%
Buses	1,404	1,470	1,484	1,433	1,314	–1.6%
Motorcycles & Bicycles	5,483	5,395	4,699	3,997	3,761	–9.0%
Total Passenger Vehicles	192,700	194,375	201,581	200,337	193,752	0.1%
Total Passenger AEU's	201,257	204,815	212,039	210,329	202,703	0.2%
Commercial Traffic						
Straight Trucks	4,561	4,246	5,024	3,978	3,839	–4.2%
Tractor & Trailer	15,111	17,104	18,252	17,250	21,095	8.7%
Total Commercial Units	19,672	21,350	23,276	21,228	24,934	6.1%
Total Freight AEU's	64,290	70,479	76,442	70,320	83,430	6.7%
Miscellaneous						
Single Crossing	5,747	5,970	6,440	6,424	6,426	2.8%

for departure purposes. In addition, Northumberland Ferries have made available assured loading tickets. These must be purchased in blocks of ten and sell at a premium of approximately 30 percent over the individually purchased tickets.

3.3 Financial Parameters

Over the 1986-1990 period, revenue and expense elements have exhibited growth slightly in excess of inflationary expectations (see Table 3.2). Both revenue and expenditure totals have a compound growth rate of 5.3 percent compared to CPI compound growth of 3.6 percent. The revenue growth has occurred in spite of the fact that passenger traffic, which is the largest contributor to demand, has remained stagnant throughout the period. The expenditure increases have been centred in the three categories of terminal wages, vessels wages and head office adminstration. There appears to be no direct correlation between these increases and the significant number of additional trips that were added in 1988.

Northumberland Ferries record a small depreciation expense for minor capital items such as vehicles and computer equipment, owned by the firm. In discussion with Transport Canada, an annual figure of $.750 million has been added to both depreciation expense and government revenue categories to account for capital provided to this service by the federal government. Docking and terminal facilities at both Wood Islands and Caribou are owned by Transport Canada.

The annual operating contract was approximately $7.2 million in the 1990/91 fiscal year. This is slightly less than one third of the subsidy provided to Marine Atlantic on the Borden/Tormentine crossing. In terms of auto equivalents moved, Northumberland Ferries handles a volume of traffic about 23 percent as large as Marine Atlantic Borden/Tormentine. The size of vessels and the length of crossings involved are contributing factors to the traffic moving capabilities of either firm.

Table 3.2
Northumberland Ferries Ltd.
Income/Expense Information
('000's)

	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate
Revenues						
Transportation	$3,421	$3,695	$3,972	$4,185	$4,390	6.4%
Lunch Counter	$559	$603	$634	$649	$681	5.1%
Miscellaneous	$114	$134	$159	$157	$94	–4.9%
Subtotal	$4,094	$4,431	$4,765	$4,990	$5,165	6.0%
Government Contract	$5,723	$5,839	$6,216	$6,310	$7,212	6.0%
Government for Depreciation	$750	$750	$750	$750	$750	–
Subtotal, Government	$6,473	$6,589	$6,966	$7,060	$7,962	5.3%
Total	$10,567	$11,021	$11,730	$12,051	$13,127	5.0%
Expenses						
Terminal Wages	$379	$426	$427	$484	$512	7.0%
Terminal Maintenance	$90	$111	$120	$99	$95	1.0%
Vessel Wages	$4,896	$5,355	$5,828	$6,006	$6,459	7.0%
Vessel Maintenance	$2,187	$2,047	$2,251	$2,236	$2,612	4.0%
Charter–Hire	$440	$440	$440	$440	$440	0.0%
Fuel	$1,286	$1,371	$1,381	$1,412	$1,463	3.0%
Head Office Administration	$443	$418	$452	$498	$564	6.0%
Depreciation *	$772	$776	$776	$765	$760	0.0%
Total	$10,494	$10,943	$11,675	$11,941	$12,906	5.3%
Net Income	$73	$77	$55	$110	$221	6.0%

* A depreciation allowance of $750,000 per annum has been added to reflect a capital cost for terminal buildings and docking facilities which are owned by the government and provided to this service without charge.

3.4 Capacity Utilization

The Wood Islands to Caribou ferry service experiences very high utilization of capacity provided. For the operating season as a whole, during the 1986 to 1990 period, fully 75 percent of available capacity has been occupied. During the peak summer months, capacity constraints are evident through the frequent occurrence of long waiting times.

Capacity additions to this service have been contemplated for some time but have not been acted upon, pending a resolution of whether a fixed crossing would be built to Prince Edward Island. While the latter issues awaits a decision, it has been determined that federal funding to this service will continue regardless of a fixed crossing. A recent announcement that a new 214 A.E.U. vessel ($48 million) will be constructed for this service has been made. It will replace two of the existing vessels. Long range intentions are for a second 214 A.E.U. vessel to be built for this crossing.

3.5 Summary and Future Direction

Northumberland Ferries has many of the operating parameters of Marine Atlantic with its rates, service levels, and subsidy payments agreed to by Transport Canada. It is effectively capacity constrained in the summer months.

The future of Northumberland ferries will be affected by:

- a fixed crossing to Prince Edward Island;
- new vessel construction;
- pressures for decreased federal funding; and
- economic and tourism activity in the region.

4.0 BRITISH COLUMBIA FERRY CORPORATION

4.1 Corporate History, Mandate and Operating Parameters

The choice of Victoria on Vancouver Island as the capital of British Columbia and an extensive coastline that stretches from south of the 49th parallel (on Vancouver Island) to the Alaskan Panhandle, creates a natural environment for the development of marine transportation systems. At the time of union with Canada in 1871, significant shipping activity was evident from the mainland to Vancouver Island and up and down the coastline. The Hudson's Bay Company, Canadian Pacific Steamship and the Union Steamship Company all were major operators on the West Coast from the 1880's to the 1950's. In 1951 the Black Ball Line built terminals at Horseshoe Bay and Departure Bay and began to compete with the services provided by Canadian Pacific. In 1958, major union/management confrontations at both Black Ball and Canadian Pacific resulted in service disruptions. The imposition of the British Columbia Civil Defense Act was ignored by the unions causing the Premier to announce that the Province would initiate its own service. The Provincial decision was a culmination of several years of frustration with services being provided by the existing operators.

British Columbia Ferries was initially established under the Ferry and Toll Bridges Authority which later became the B.C. Ferry Authority. In 1976 a Ferry Corporation Act was passed which among other things gave B.C. Ferries the mandate:

> "to establish, operate, administer and maintain a ferry, shipping and related service, including....the ferry system, and to engage in any other business or undertaking necessary or incidental to the operation of a ferry, shipping or related service"

The Ministry of Finance and Corporate Relations administers the Ferry Corporation Act on behalf of the British Columbia government.

4.2 Services Provided

The British Columbia Ferry Corporation provides twenty four specific ferry routes throughout the Province. All salt water ferry operations directly administered by the Ministry of Transportation and Highways were transferred to BC Ferries in 1985. In terms of the number of ships and the number of routes the Company is one of the largest ferry operations in the world. Because of the large number of routes, five service area designations have been developed to categorize groups of services which share similar geographic and operating conditions. These service areas are as follows:

- Vancouver Island/Mainland;
- Sunshine Coast;
- Gulf Islands;
- Mid and North Island; and
- Mid and North Coast

Discussion on specific services below has generally been confined to the two largest services within each service area. The ten services involved represent approximately 75 percent of all traffic moved by BC Ferries. Table 4.1 has been presented to show aggregate traffic activity for BC Ferries for the 1986 to 1990 period. Table 4.2 illustrates specific characteristics of the 10 major ferry services being profiled. Detailed traffic statistics for individual services is contained in Appendix B.

Table 4.1
All Services by
British Columbia Ferry Corporation
Five Year Traffic Profile, 1986 – 1990

Traffic	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate
Passenger Traffic						
Passengers	18,235,182	17,014,098	17,919,144	19,228,592	19,775,217	2.0%
pax veh, underheight	5,765,365	5,620,273	5,995,752	6,527,753	6,723,979	3.9%
pax veh, overheight	346,351	387,993	397,883	427,101	431,590	5.7%
trucks, underheight	40,498	57,421	48,684	53,700	53,903	7.4%
trucks, overheight	51,988	56,111	58,623	67,171	70,290	7.8%
buses	54,687	42,430	45,308	49,988	52,422	−1.1%
motorcycles	60,528	67,295	57,126	60,631	62,630	0.9%
bicycles	49,590	73,207	73,975	72,168	87,580	15.3%
Total Pax Vehicles	6,369,007	6,304,730	6,677,351	7,258,512	7,482,394	10.3%
Total Pax Vehicles (in auto equivalents)	6,428,791	6,316,383	6,693,992	7,286,320	7,499,658	3.9%
Commercial Traffic						
Commercial Vehicles	206,256	259,395	281,408	312,869	312,656	11.0%
Commercial Vehicles (in auto equivalents)	618,768	778,185	844,224	938,607	937,968	11.0%
Total Traffic (in auto equivalents)	6,997,969	7,094,568	7,538,216	8,224,927	8,437,626	4.8%

Table 4.2
British Columbia Ferry Corporation Service Description
1990/91 Traffic Statistics

Service	Crossing Distance (km)	Sailing Time (hrs)	Volume Passengers	Volume Vehicles (auto equiv)	Passenger Vehicles			Commercial Vehicles		1–Way Fare Vehicle & Driver	Fare/km Vehicle & Driver
					Volume (auto equiv)	% of Total	% of Total during Peak	Volume (auto equiv)	% of Total		
Vancouver Island/Mainland											
**Tsawwassen/Swartz Bay	44	1.5	5,922,208	2,221,252	1,946,371	88%	22%	274,881	12%	$22.50	$0.51
**Horseshoe Bay/Nanaimo	56	1.5	3,790,741	1,595,093	1,396,763	88%	23%	198,330	12%	$22.50	$0.40
Sunshine Coast											
**Horseshoe Bay/Langdale	18	0.7	2,324,200	1,145,356	1,020,100	89%	20%	125,200	11%	$22.50	$1.25
**Comox/Powell River	31	1.2	288,558	116,134	105,205	91%	24%	10,929	9%	$22.50	$0.73
Gulf Islands											
**Swartz Bay/Outer Gulf Is.	n/a	n/a	378,120	198,945	182,250	92%	21%	16,695	8%	$7.60	n/a
**Tsawwassen/Gulf Island	n/a	n/a	595,595	198,297	190,791	96%	26%	7,506	4%	$20.00	n/a
Mid and North Island											
**Campbell River/Quadra Is.	3	0.2	896,200	367,800	358,600	92%	20%	29,200	8%	$7.25*	$1.21
**Nanaimo Harb./Gabriola Is.	7	0.3	800,400	360,600	336,500	93%	18%	24,100	7%	$9.00*	$0.52
Mid and North Coast											
**Prince Rupert/Skidegate	172	6.5	44,203	22,080	13,860	63%	23%	8,220	37%	$73.00	$0.42
**Bear Cove/Bella Bella/ Prince Rupert	507	15	69,226	18,833	18,233	97%	37%	600	3%	$230.00	$0.45

*return fare

4.2.1 Vancouver Island to Mainland Service Area

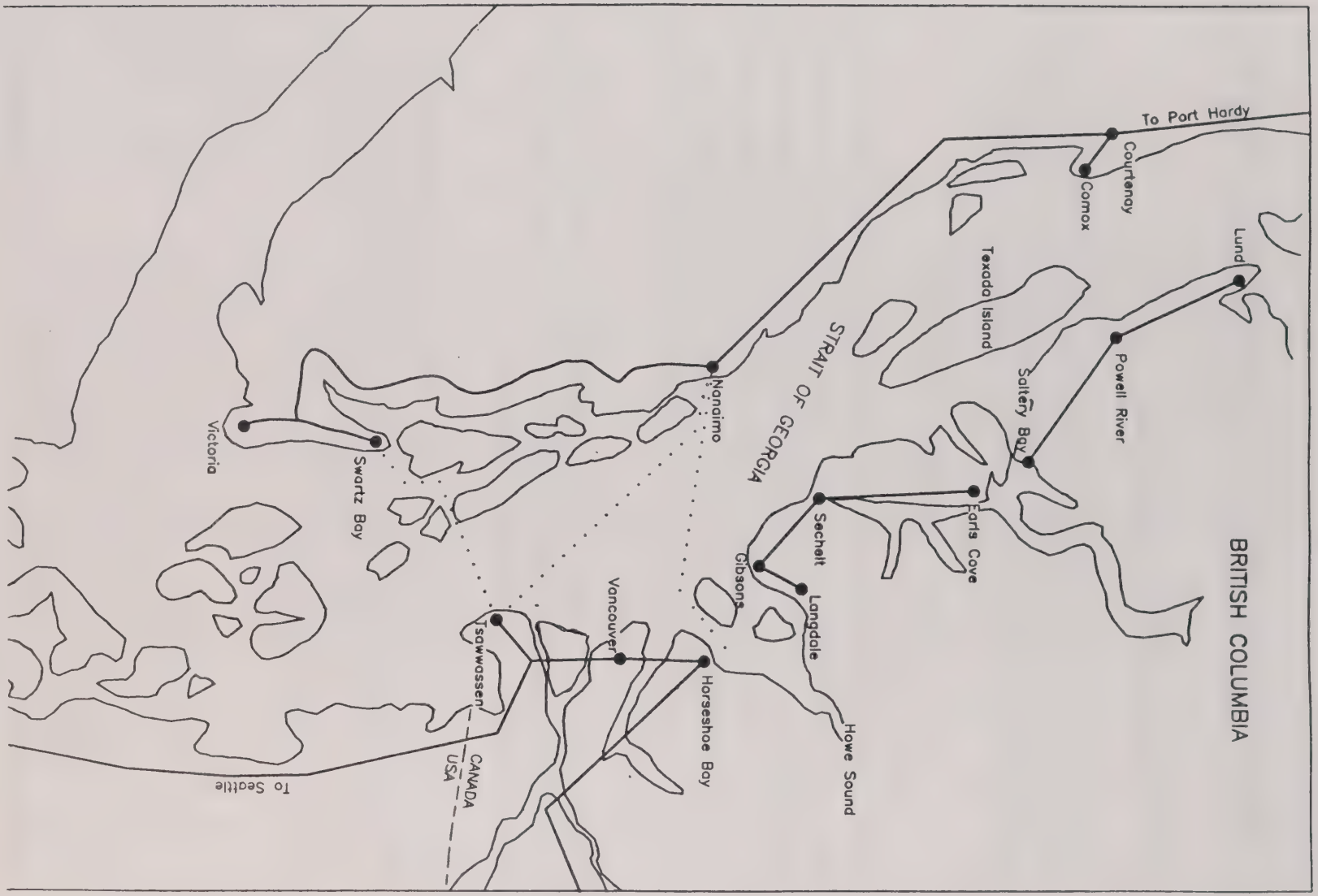
The Vancouver Island to Mainland Service Area is illustrated in Figure 4.1. It is composed of three services; Swartz Bay to Tsawwassen, Horseshoe Bay to Nanaimo and Tsawwassen to Nanaimo. The latter service only commenced in May of 1990 and will not be profiled.

ROUTE 1: SWARTZ BAY - TSAWWASSEN

The 44 kilometre route between Swartz Bay and Tsawwassen, which has a sailing time of 1.5 hours, is the dominant route in the system. It carries 31 percent of the system-wide passengers, 26 percent of all vehicles, 30 percent of all commercial vehicles, and 65 percent of all buses. From information provided in Table 4.1 it is noted that passenger vehicle activity accounts for 88 percent of total vehicle activity on this service. The peak season months of July and August represent 28 percent of passenger activity and only 12 percent of commercial movements.

Historical surveys done indicate that 40 percent of peak season travellers are from out of the province. The one way fare for a vehicle and driver was $22.50 in the 1990/91 operating year. On a kilometre of crossing distance this translates into $.51.

Total vehicle traffic on Route 1 has grown at an annual compound rate of 1.5 percent over the past 5 years. The fastest growing period of the year has been March/April and the fastest growing traffic segment has been commercial vehicles. Commercial vehicles have also been increasing in length. In 1984/85 the average CV was 44.6 feet. By 1989/90 this had increased by 11.4 percent to 49.7 feet.



VANCOUVER ISLAND SERVICE AREA

FIGURE 4.1

Operating conditions on this crossing are generally good with weather and sea conditions reported to be a cause of cancellation only about one day per year. The absence of ice, and shelter provided by islands, contribute to the benign conditions. These operating factors are generally prevalent on all except the most northerly routes provided by BC Ferries.

ROUTE 2: HORSESHOE BAY - NANAIMO

The 56 kilometre route between Horseshoe Bay and Nanaimo (Departure Bay) is the second busiest in the system although its share has declined significantly since the introduction of Tsawwassen to Nanaimo service (Route 30) in May 1990. Passenger traffic also dominates this service and it has an identical rate structure with the Tsawwassen to Swartz Bay crossing. Since it is slightly longer the per kilometre fare reduces to $.48.

Peaking factors for July and August are 23 percent for passenger traffic and 12 percent for commercial traffic. Historical surveys indicate that 25 percent of peak season travellers are from out of province.

Prior to the introduction of Route 30, this service had experienced a four year growth rate of 4.1 percent in total auto equivalents carried. Significantly higher increases had been recorded in commercial traffic. In the short term at least, volumes of traffic on this crossing will continue to be affected by capacity additions on Route 30. Commercial vehicles have also been increasing in length. In 1984/85 the average CV was 48.3 feet. By 1989/90 this had increased by 12.2% to 54.2 feet.

SUNSHINE COAST SERVICE AREA

FIGURE 4.2

4.2.2 Sunshine Coast Service Area

The Sunshine Coast Service Area is illustrated in Figure 4.2. It is composed of six services; Horseshoe Bay to Langdale, Earls Cove to Saltery Bay, Horseshoe Bay to Bowen Island, Langdale/Gambier Island/Keats Island, Comox to Powell River and
Texada to Powell River.

ROUTE 3: HORSESHOE BAY - LANGDALE

The 18 kilometre route between Horseshoe Bay and Langdale is the third busiest route in the system. It carries 13 percent of all vehicle traffic and 12 percent of all passenger traffic. Its rate structure for passengers and vehicles makes it one of the most expensive crossings, on a distance basis, in the BC Ferries system. A vehicle and driver is charged an equivalent of $.63 kilometre of crossing distance. Fully 89 percent of auto equivalent utilization is passenger related.

July and August traffic represents about 20 percent of annual passenger movements and 11 percent of commercial movements. The only comprehensive passenger survey on Route 3 was done in the summer of 1979. The results indicated that only 11 percent of the summer traffic was from out of province. The average customer took 21 round-trips per year. Only 3 percent of the traffic was commuting to work.

Total vehicle traffic on Route 3 has grown at an annual compound rate of 6.7 percent during the past 5 years. The fastest growing period of the year has been September/October.

Much of the recent upsurge in traffic on Route 3 has resulted from construction activity at the Port Mellon pulp and paper mill which is expected to be completed in 1991. Construction of the Vancouver Island gas pipeline began in late 1989. Besides the short term construction activity, the pipeline could lead to longer term industrial development.

ROUTE 17: COMOX - POWELL RIVER

The 31 kilometre route between Comox (Little River) and Powell River (Westview) is the 13th largest in the system. It too is a highly passenger oriented service with 91 percent of vehicles carried being passenger related. A one way passenger and vehicle fare was $22.50 in 1990/91. For the crossing distance, this represents $.73 per kilometre.

Passenger traffic during July and August is 24 percent of yearly totals. Commercial traffic during this period is a very light 9 percent of total carryings. The passenger survey conducted during the summer of 1990 indicated an average group size of 2.8 and average round-trips per year of 11. Pleasure, recreation and visiting account for 67 percent of customer trips with business trips accounting for 17 percent. Powell River residents made up 29 percent of the sample, Courtenay/Comox 11 percent, and out of province 16 percent.

Total vehicle traffic on Route 17 has increased at an annual compound rate of 4.7 percent since 1986. The off season has been the fastest growing period of the year, with March/April growing at 8.9 percent.

Powell River's work force is reliant on primary and processing industries and related activities of the forest industry. However, employment in this sector is expected to continue to decline as technological changes are implemented throughout the industry.

The economy of the Comox Valley is reliant upon the tourism, forestry, fishing and agriculture industries. The area is also a government administrative centre and has an Armed Forces Base in Comox. Economic growth has been healthy in the past few years and is expected to continue.

4.2.3 Gulf Island Service Area

The Gulf Island Service Area is illustrated in Figure 4.3. It consists of five individual services; Swartz Bay to Fulford Harbour, Outer Gulf Islands to Swartz Bay, Vesuvius to Crofton, Gulf Islands to Tsawwassen, and Brentwood Bay to Mill Bay. These routes are used by residents, cottagers and summer visitors to enjoy the rural beauty of the islands while maintaining access to facilities offered by Vancouver and Victoria. As such they are highly passenger oriented services.

ROUTE 5: OUTER GULF ISLANDS - SWARTZ BAY

There are two vessels which operate on this route serving Galiano, Mayne, Pender and Saturna Islands. A Tsawwassen Class vessel (138 cars) and a 30-car ferry operate on the route during the peak season (with some supplementary sailings provided by the Queen of Burnaby) while a 70-car and 30/16-car ferry operate during off-peak periods. The furthest leg of this multi-port route is between Swartz Bay and Saturna covering a distance of 27 kilometres. Compared to all routes in the system, it is the eleventh largest in terms of vehicles and passengers (prior to the introduction of Route 30). Approximately 40 percent of the traffic originates or is destined for Pender Island while 20 percent is attributable to Galiano Island, 16 percent to Mayne Island and 11 percent to Saturna Island.

July and August traffic is about one fifth of annual passenger traffic and only 8 percent of commercial traffic totals. Total vehicle traffic on Route 5 has grown at an annual compound rate of 7.6 percent during the past 5 years.

GULF ISLAND SERVICE AREA

FIGURE 4.3

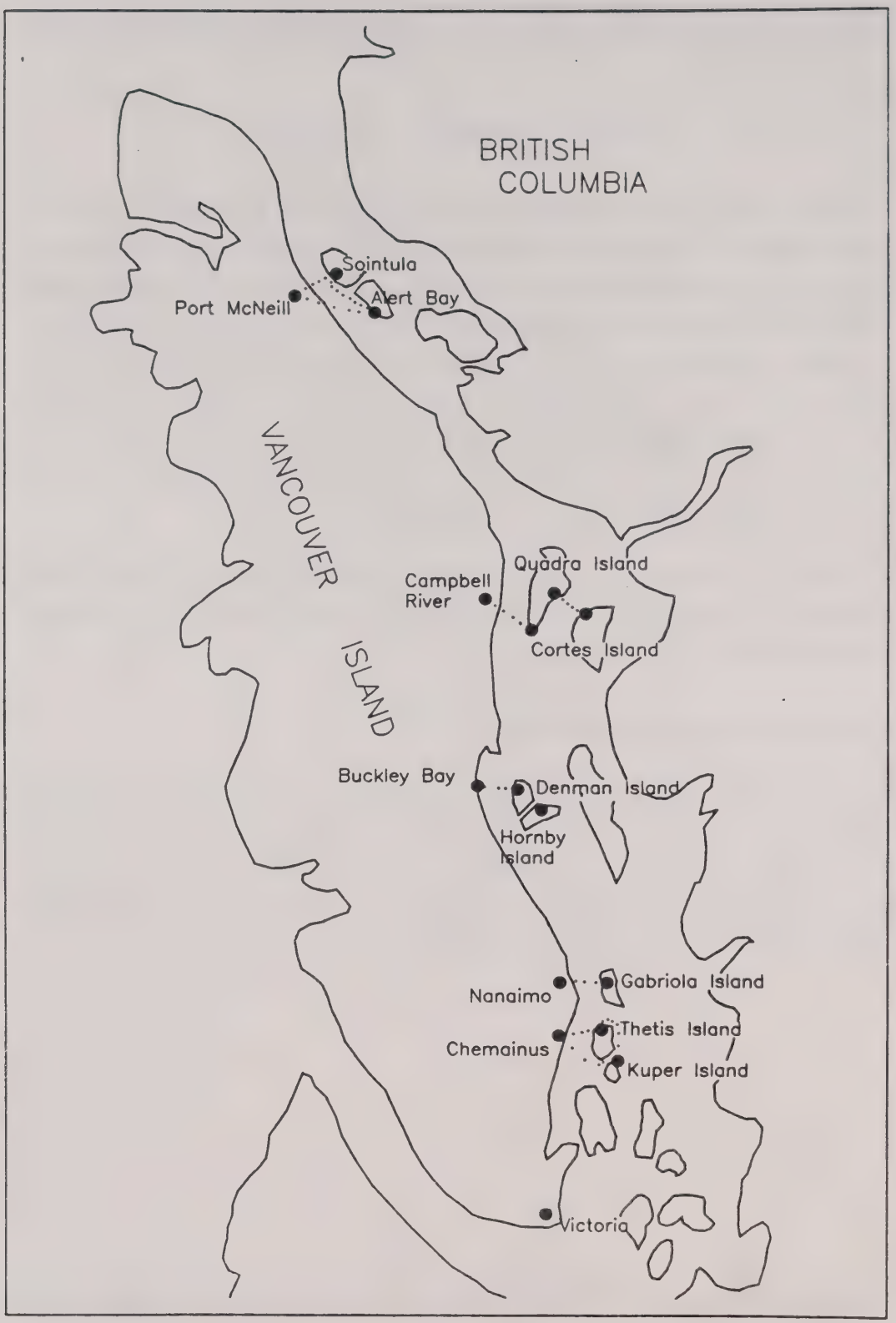
ROUTE 9: GULF ISLANDS - TSAWWASSEN

This route services Galiano, Mayne (with connecting service to Saturna), Pender and Saltspring Islands. The furthest leg of this multi-port route is between Tsawwassen and Long Harbour covering a distance of 38 kilometres. This service also has a reservation system enabling travellers to ensure their passage on a particular sailing. Compared to all routes in the system, it is the ninth largest in terms of vehicles and eighth in passengers (prior to the introduction of Route 30). Approximately 36 percent of the traffic originates or is destined for Saltspring Island while 25 percent is attributable to both Galiano and Mayne Islands and 15 percent to Pender Island. The route is one of three routes serving Saltspring Island and accounts for approximately 13 percent of the traffic to and from the Island.

Peak season passenger traffic represents about 26 percent of total annual passenger activity. Total vehicle traffic on Route 9 has grown at an annual compound rate of 26.1 percent during the past 5 years.

4.2.4 Mid and North Island Service Area

The Mid and North Island Service Area is illustrated in Figure 4.4. It consists of seven services; Nanaimo to Gabriola Island, Chemainus to Thetis Island to Kuper Island, Denman Island to Buckley Bay, Hornby Island to Denman Island, Campbell River to Quadra Island, Cortes Island to Quadra Island, and Port McNeill to Sointula to Alert Bay. These are basically short commuter routes for passenger related traffic.



MID AND NORTH ISLAND SERVICE AREA

FIGURE 4.4

ROUTE 19: NANAIMO - GABRIOLA ISLAND

The 7 kilometre route between Nanaimo Harbour and Gabriola Island (Descanso Bay) is the fifth largest in the system (prior to the introduction of Route 30). On a per kilometre basis, a one way fare for vehicle and driver is $.52.

Peak season passenger traffic is only 18 percent of total annual activity and only 7 percent of commercial traffic travels during this period. The passenger survey done in June 1988 indicated that less than 2 percent of the traffic was from out of province, and 74 percent of the customers were Gabriola residents. The average customer made 4.7 one way trips per week and 32 percent were commuting to work. Total vehicle traffic on Route 19 has grown at an annual compound rate of 6.1 percent since 1987.

ROUTE 23: CAMPBELL RIVER - QUADRA ISLAND

The 3 kilometre route between Campbell River and Quadra Island (Quathiaski Cove) is the fourth busiest route in the system (prior to the introduction of Route 30). The $7.25 charge for a round trip passenger and vehicle trip converts into $1.21 per kilometre. This gives this service one of the highest distance based charges in the BC Ferries system.

Only 20 percent of passenger traffic and 8 percent of commercial traffic moves during the peak summer months of July and August. A passenger survey done in June 1988 indicated that 66 percent of the customers were Quadra Island residents, and only 2 percent were from out of province. The average customer took five one-way trips per week and 29 percent of the customers were commuting to work. Total vehicle traffic on Route 23 has increased at an annual compound rate of 2.3 percent since 1987.

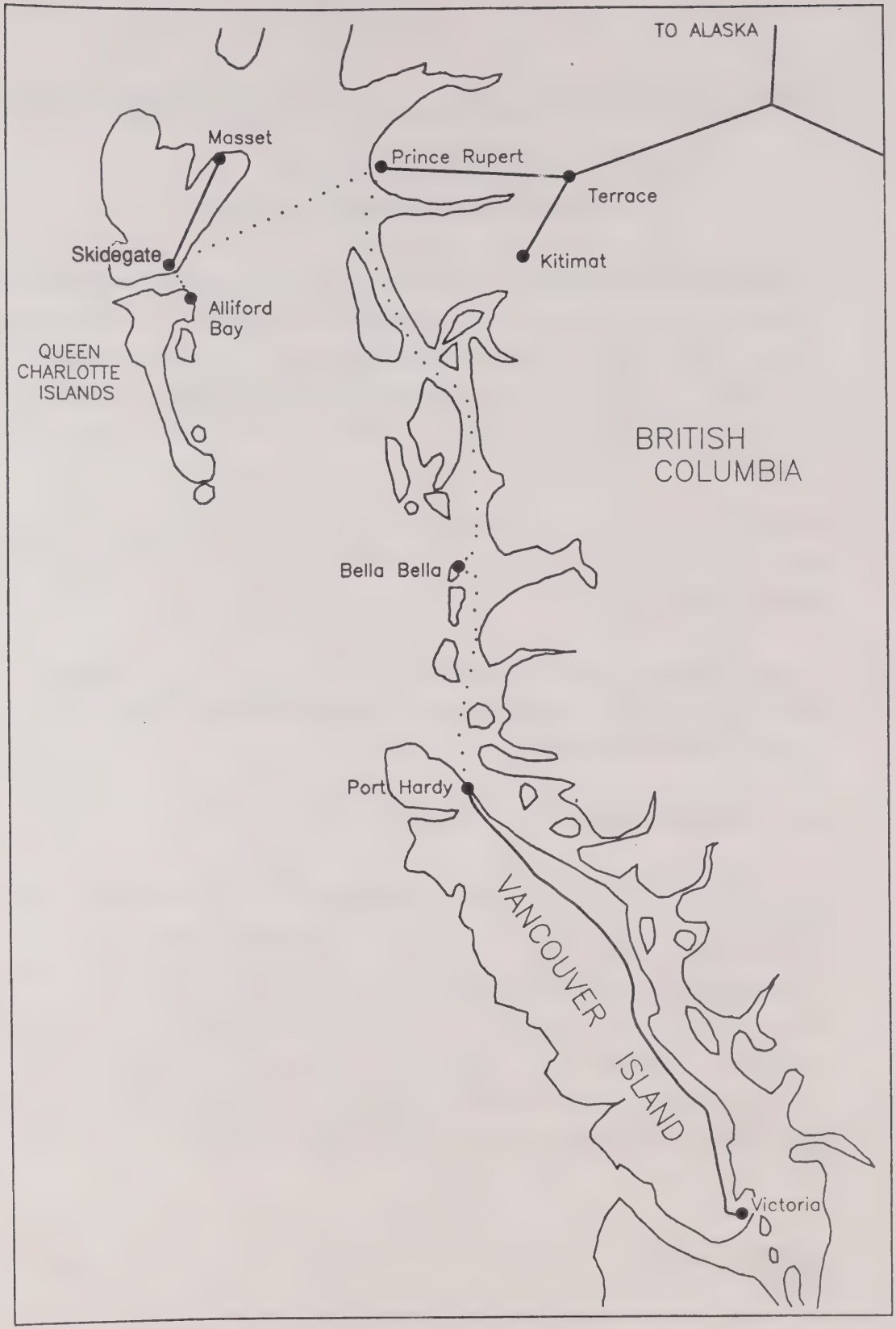
4.2.5 Mid and North Coast Service Area

Figure 4.5 illustrates the Mid and North Coast Service Area. It consists of three services; Port Hardy to Bella to Prince Rupert, Prince Rupert to Skidegate, and Skidegate to Alliford Bay. During the winter months occasional freezing spray and rough waters in open passages create the need for vessels to seek shelter.

ROUTE 10: PORT HARDY - BELLA BELLA - PRINCE RUPERT

The 507 kilometre route between Port Hardy (Bear Cove), Bella Bella, and Prince Rupert is the 21st busiest in the system with only Route 11 and Route 13 carrying smaller volumes of traffic. This service is almost completely passenger oriented with only 600 auto equivalents of commercial traffic carried in 1990/91. Despite the fact that it is a distance of over 500 kilometres, the rate for a vehicle and driver passage is $.45 per kilometre.

This service is one of the most seasonally peaked that BC Ferries operates. Over 37 percent of passenger traffic is carried during July and August. Passenger surveys were done on this route in 1979, 1983, and 1988. The last comprehensive survey indicated that over 40 percent of the travellers were from out of province and 45 percent were taking their first trip on Route 10. The most important factors in choosing to travel on the Inside Passage were scenery and convenience. Route 10 is one of three routes (with Route 9 and 11) that offer a reservation service. Total vehicle traffic has decreased at an annual compound rate of .7 percent during the past 10 years.



NORTH COAST SERVICE AREA

FIGURE 4.5

ROUTE 11: PRINCE RUPERT - SKIDEGATE

The 172 kilometre route between Prince Rupert and the Queen Charlotte Islands (Skidegate) carries the lowest volume of traffic in the system (with the exception of the passenger- only service on Route 13). Of the major services profiled, Route 11 has the highest commercial traffic utilization. Commercial auto equivalents account for 37 percent of total activity. The one way passenger fare for vehicle and driver can be converted into a charge of $.42 per kilometre of crossing distance.

Twenty-three percent of passenger traffic and 37 percent of commercial traffic occurs during the months of July and August. Route 11 is one of three routes (with Routes 9 and 10) that provide a reservation service.

Total vehicle traffic on Route 11 has grown at an annual compound rate of 2.1 percent during the 1986/1900 period. During the summer of 1990, peak season service was increased from five to six round-trips per week.

4.3 Financial Parameters

Broad categories of income and expense information for fiscal years 1989/90 and 1990/91 are displayed in Table 4.3. Transportation and catering revenue amounted to $228.8 million in 1990/91 which was an improvement of 6.3 percent over the previous year. A combination of rate increases and traffic growth over a four-year period has produced a commercial revenue compound growth of approximately 8 percent per annum. Total operating expenditures over a similar four-year time span have grown at a slower pace of 4 percent per year. It is worthy of note however that the depreciation expense calculation for 1990/91 reflects a substantive change in amortization periods for certain fixed assets.

Table 4.3
British Columbia Ferry Corporation
Statement of Operations and Deficit
Year Ended March 31,1991

	(expressed in thousands) 1990/91	1989/90
OPERATING REVENUES		
Tolls	$186,335	$174,837
Catering and other income	$42,429	$40,375
Operating subsidy	$13,104	$6,915
	$241,868	$222,127
OPERATING EXPENSES		
Salaries, wages and benefits	$146,659	$130,983
Fuel	$31,270	$26,445
Contracted services	$24,654	$23,228
Materials and supplies	$15,139	$15,393
Cost of food and goods sold	$15,121	$14,366
Depreciation and amortization (net)	$10,698	$28,087
Administration	$6,211	$3,082
Professional services	$5,333	$4,605
	$255,085	$246,189
EXCESS OF OPERATING EXPENSES OVER OPERATING REVENUES	−$13,217	−$24,062
Interest income	$18,312	$12,643
Interest on long term obligations	−$9,128	−$10,091
Net financing income	$9,184	$2,552
EXCESS OF EXPENSES OVER REVENUES FOR THE YEAR	−$4,033	−$21,510
DEFICIT AT BEGINNING OF YEAR	−$90,657	−$69,147
DEFICIT AT END OF YEAR	−$94,690	−$90,657

For instance, this change in procedures fixed the useful life of vessels at 40 years compared to a previous useful life of 25 years. This has had the effect of reducing the 1990/91 depreciation charge considerably.

The British Columbia government provided BC Ferries with an annual subsidy of $51 million from 1989 to 1991. The amount of the annual subsidy since 1991 has been subject to a negotiation process which has had the effect of reducing it somewhat. The Corporation applies the subsidy firstly to cover any annual operating loss excluding depreciation less net financing income and long term debt and capital lease repayments. It is applied secondly to a capital subsidy account and used to finance capital maintenance and expansion. The expended portion of the capital subsidy is amortized on the same basis as the related fixed assets are depreciated and is netted against depreciation on the statement of operations. This procedure for the provincial subsidy was initiated in 1989/90. It is estimated that approximately $2.3 million would have to be added to depreciation in 1990/91 to reflect the true cost of capital involved.

4.3.1 Vancouver Island Service Area

The information contained in Tables 4.4 and 4.5 permit a comparison of revenues and expenses for individual services and service areas. The Vancouver Island service area is a highly profitable one for BC Ferries. In 1990/91 net revenues exceeded total direct expense by $37.434 million producing a cost recovery ratio of 131 percent. Each of the three services in this category has a cost recovery of 100 percent or more.

Tsawwassen to Swartz Bay was the most successful service with a cost recovery ratio of 139 percent. The recently introduced "Mid Island Express" from Nanaimo to Tsawwassen which operated for part of the year basically broke even. Expectations are for continued traffic growth on this service.

Table 4.4
British Columbia Ferry Corporation Statement of Revenue by Route for 1989/90 and 1990/91
(all figures in thousands)

Service	Transportation Revenue 90/91	Transportation Revenue 89/90	Catering 90/91	Catering 89/90	Cost of Sales 90/91	Cost of Sales 89/90	Parking and Other Income 90/91	Parking and Other Income 89/90	Net Revenues 90/91	Net Revenues 89/90
Vancouver Island/Mainland										
Tsawwassen/Swartz Bay	$72,068	$69,247	$18,711	$17,961	$7,311	$7,158	$1,504	$1,715	$84,972	$81,765
Horseshoe Bay/Nanaimo	$50,751	$59,001	$11,298	$12,237	$4,415	$4,852	$1,090	$1,403	$58,724	$67,789
Tsawwassen/Nanaimo	$13,474	–	$2,459	–	$1,038	–	–	–	$14,895	$0
Subtotal	$136,293	$128,248	$32,468	$30,198	$12,764	$12,010	$2,594	$3,118	$158,591	$149,554
Sunshine Coast										
Horseshoe Bay/Langdale	$15,883	$14,775	$2,611	$2,400	$861	$793	–	–	$17,633	$16,382
Saltery Bay/Earl's Cove	$2,730	$2,633	$240	$225	$69	$73	–	–	$2,901	$2,785
Horseshoe Bay/Bowen Island	$2,265	$2,104	–	–	–	–	–	–	$2,265	$2,104
Langdale/Gambier & Keats Is.	$52	$45	–	–	–	–	–	–	$52	$45
Comox/Powell River	$3,420	$3,209	$388	$355	$135	$136	–	–	$3,673	$3,428
Powell River/Texada	$467	$420	–	–	–	–	–	–	$467	$420
Subtotal	$24,817	$23,186	$3,239	$2,980	$1,065	$1,002	$0	$0	$26,991	$25,164
Gulf Islands										
Swartz Bay/Saltspring	$2,278	$2,019	$10	$7	–	–	–	–	$2,288	$2,026
Crofton/Saltspring	$1,098	$899	–	–	–	–	–	–	$1,098	$899
Brentwood/Mill Bay	$577	$523	–	–	–	–	–	–	$577	$523
Swartz Bay/Outer Gulf Islands	$1,390	$1,291	$274	$232	$96	$85	–	–	$1,568	$1,438
Swartz Bay/Outer Gulf Islands	–	–	–	–	–	–	–	–	$0	$0
Tsawwassen/Gulf Islands	$4,865	$4,411	$1,124	$1,065	$431	$418	–	–	$5,558	$5,058
Subtotal	$10,208	$9,143	$1,408	$1,304	$527	$503	$0	$0	$11,089	$9,944
Mid and North Island										
Nanaimo Harbour/Gabriola Islan	$1,551	$1,420	$2	$1	–	–	–	–	$1,553	$1,421
Chemainus/Thetis Is./Kuper Is.	$329	$304	–	–	–	–	–	–	$329	$304
Buckley Bay/Denman Island	$776	$720	–	–	–	–	–	–	$776	$720
Denman Island/Hornby Island	$393	$304	–	–	–	–	–	–	$393	$304
Campbell River/Quadra Island	$1,467	$1,405	$4	$4	–	–	–	–	$1,471	$1,409
Quadra Island/Cortes Island	$235	$229	–	–	–	–	–	–	$235	$229
Port McNeill/Alert Bay/ Sointula	$622	$584	$3	$2	–	–	–	–	$625	$586
Subtotal	$5,373	$4,966	$9	$7	$0	$0	$0	$0	$5,382	$4,973
Mid and North Coast										
Prince Rupert/Skidegate	$2,399	$2,383	$529	$525	$74	$84	–	–	$2,854	$2,824
Skidegate/Alliford Bay	$350	$333	–	–	–	–	–	–	$350	$333
Bear Cove/Bella Bella/ Prince Rupert	$6,895	$6,578	$2,182	$2,243	$691	$767	–	–	$8,386	$8,054
Subtotal	$9,644	$9,294	$2,711	$2,768	$765	$851	$0	$0	$11,590	$11,211
Total	$186,335	$174,837	$39,835	$37,257	$15,121	$14,366	$2,594	$3,118	$213,643	$200,846

Table 4.5
British Columbia Ferry Corporation Statement of Expenses by Route for 1989/90 and 1990/91
(all figures in thousands)

Service	Ships		Terminals		Overhead		Depreciation		Total	
	90/91	89/90	90/91	89/90	90/91	89/90	90/91	89/90	90/91	89/90
Vancouver Island/Mainland										
Tsawwassen/Swartz Bay	$36,401	$36,664	$13,258	$11,478	$7,653	$7,183	$3,759	$8,444	$61,071	$63,769
Horseshoe Bay/Nanaimo	$29,563	$36,340	$8,370	$7,715	$5,586	$6,712	$1,744	$6,642	$45,263	$57,409
Tsawwassen/Nanaimo	$11,072	-	$1,211	-	$1,994	-	$546	-	$14,823	$0
Subtotal	$77,036	$73,004	$22,839	$19,193	$15,233	$13,895	$6,049	$15,086	$121,157	$121,178
Sunshine Coast										
Horseshoe Bay/Langdale	$9,533	$7,496	$4,933	$3,375	$2,067	$1,839	$854	$1,713	$17,387	$14,423
Saltery Bay/Earl's Cove	$3,049	$3,044	$1,087	$1,026	$647	$612	$96	$275	$4,879	$4,957
Horseshoe Bay/Bowen Island	$1,993	$1,710	$815	$631	$425	$368	$124	$226	$3,357	$2,935
Langdale/Gambier & Keats Is.	$393	$340	$30	$13	$61	$58	$9	$11	$493	$422
Comox/Powell River	$5,062	$5,562	$856	$817	$982	$963	$148	$406	$7,048	$7,748
Powell River/Texada	$1,883	$2,209	$442	$370	$393	$407	$206	$491	$2,924	$3,477
Subtotal	$21,913	$20,361	$8,163	$6,232	$4,575	$4,247	$1,437	$3,122	$36,088	$33,962
Gulf Islands										
Swartz Bay/Saltspring	$3,185	$2,484	$1,151	$923	$599	$553	$156	$416	$5,091	$4,376
Crofton/Saltspring	$1,116	$1,090	$264	$200	$231	$195	$24	$79	$1,635	$1,564
Brentwood/Mill Bay	$687	$711	$262	$166	$115	$124	$45	$124	$1,109	$1,125
Swartz Bay/Outer Gulf Islands	$4,667	$4,352	$679	$684	$785	$757	$166	$378	$6,297	$6,171
Swartz Bay/Outer Gulf Islands	$1,460	$1,017	$274	$216	$215	$200	$162	$291	$2,111	$1,724
Tsawwassen/Gulf Islands	$6,940	$6,689	$2,528	$2,417	$1,462	$1,412	$179	$1,106	$11,109	$11,624
Subtotal	$18,055	$16,343	$5,158	$4,606	$3,407	$3,241	$732	$2,394	$27,352	$26,584
Mid and North Island										
Nanaimo Harbour/Gabriola Is.	$2,217	$2,528	$859	$875	$529	$489	$187	$529	$3,792	$4,421
Chemainus/Thetis Is./Kuper Is.	$1,743	$1,285	$190	$196	$281	$248	$114	$300	$2,328	$2,029
Buckley Bay/Denman Island	$1,757	$1,559	$797	$449	$374	$341	$210	$592	$3,138	$2,941
Denman Island/Hornby Island	$1,267	$1,139	$298	$289	$252	$217	$170	$462	$1,987	$2,107
Campbell River/Quadra Island	$2,187	$2,521	$1,996	$869	$531	$511	$362	$947	$5,076	$4,848
Quadra Island/Cortes Island	$1,176	$1,136	$101	$114	$229	$211	$119	$369	$1,625	$1,830
Prt McNeill/Alert Bay/S'tula	$2,034	$2,248	$444	$386	$396	$376	$247	$645	$3,121	$3,655
Subtotal	$12,381	$12,416	$4,685	$3,178	$2,592	$2,393	$1,409	$3,844	$21,067	$21,831
Mid and North Coast										
Prince Rupert/Skidegate	$6,389	$4,965	$1,466	$1,514	$1,068	$911	$257	$1,828	$9,180	$9,218
Skidegate/Alliford Bay	$1,142	$1,352	$71	$54	$200	$173	$84	$231	$1,497	$1,810
Bear Cove/Bella Bella/Pr. Rpt.	$8,910	$8,420	$1,854	$1,560	$1,355	$1,524	$730	$1,582	$12,849	$13,086
Subtotal	$16,441	$14,737	$3,391	$3,128	$2,623	$2,608	$1,071	$3,641	$23,526	$24,114
Subtotal	$145,826	$136,861	$44,236	$36,337	$28,430	$26,384	$10,698	$28,087	$229,190	$227,669
Contracted Services									$1,590	$1,602
Total									$230,780	$229,271

4.3.2 Sunshine Coast Service Area

The six services included in this category operate at a cost recovery of approximately 75 percent. The third largest service in the BC Ferries system, the Horseshoe Bay to Langdale route, is placed in this category and had slightly more revenue in 1990/91 than overall costs. Comox to Powell River experienced a cost recovery of approximately 52 percent while the Langdale/Gambier/Keats Island service recorded a dismal cost recovery of less than 11 percent.

4.3.3 Gulf Islands

This grouping of services which connect southern Gulf Islands to both Vancouver Island and the mainland do not approach full cost recovery. Overall costs exceeded net revenues by $16.3 million in 1990/91. The Tsawwassen to Gulf Islands service achieved a cost recovery ratio of 50 percent while the Swartz Bay to Outer Gulf Islands routings managed a very poor recovery of 18.6 percent of total costs.

4.3.4 Mid and North Island Service Area

The revenue to expense ratio for this service grouping is the lowest in BC Ferries. It amounted to 25.5 percent in the 1990/91 operating year. Nanaimo to Gabriola Island is slightly better than the average with a cost recovery of 40.9 percent. Campbell River to Quadra Island recovers only 28.9 percent of its total costs of operation.

4.3.5 Mid and North Coast

The Bear Cove/Bella Bella/Prince Rupert routing produces a cost recovery ratio of approximately 65 percent. However this translates into a loss of $4.5 million in 1990/91. The

Prince Rupert to Skidegate crossing lost $6.3 million in 1990/91 for an overall cost recovery of only 31 percent.

4.4 Capacity Utilization

BC Ferries Corporation maintains relatively good statistics on capacity utilization for services with significant vehicle movements. The 1990/91 annual results for services that have been profiled in Section 4.2 are as follows:

- Route 1 - Tsawwassen to Swartz Bay 86 percent
- Route 2 - Nanaimo to Horseshoe Bay 67 percent
- Route 3 - Horseshoe Bay to Langdale 58 percent
- Route 5 - Outer Gulf Islands to Swartz Bay 39 percent
- Route 9 - Gulf Islands to Tsawwassen 49 percent
- Route 10 - Port Hardy/Bella Bella/Prince Rupert 93 percent
- Route 11 - Prince Rupert to Skidegate 75 percent

The peak travel month is August for the system as a whole. Utilization factors are generally higher for this month for each of the services noted above.

4.5 Summary and Future Directions

The British Columbia Ferry Corporation is a very large organization whose services are provided in a relatively friendly operating environment. Although demand demonstrates seasonal peaking, it is less pronounced here compared to east coast services.

Additionally the services are predominately passenger oriented. BC Ferries fleet has an average age of 24 years which is partially responsible for a requirement for a large capital

program over the next five years. The Corporation, with services that effectively connect two large urban areas - Southern Vancouver Island and Greater Vancouver, has the advantage of achieving significant operating profits on these routes which can be used to cross subsidize other activities.

BC Ferries commenced a five-year major capital replacement and improvement program in 1989. The program is worth $440 million and comprises:

- two 470-car "S" Class ferries for delivery in early 1993 and 1994.
- two 85-car ferries for delivery in 1991 and 1992. The latter will have retractable platform decks allowing for an additional 40 cars to be carried.
- terminal redevelopment at Swartz Bay and Tsawwassen for completion in 1993.

The "S" Class vessels will likely go on the Swartz Bay/Tsawwassen route, while the 85-car ferries will service the southern Gulf Islands and/or Sunshine Coast routes.

The future of the British Columbia Ferry Corporation will be influenced by such factors as:

- the requirement for capital additions;
- new high speed ferry technology and the possibility of new competition;
- continuing traffic growth; and
- pressures to achieve full cost recovery.

5.0 DEVELOPMENT OF UNIT COSTS AND ANALYSIS

5.1 Introduction

The purpose of this chapter is to develop a consistent set of ferry passenger unit costs for each of the three carriers being examined in this study. A number of steps are required for this analysis to be completed. They include;

- Development of a common cost platform among services;
- Separation of freight versus passenger activities and costs; and
- Definition of a suitable output measure.

Each of these steps is commented upon in subsequent sections.

Once the carrier specific unit costs are generated, an examination of possible reasons for intercorporate variances will be conducted.

5.2 Development of a Uniform Cost Platform

Cost information provided by all three companies has been described in preceding chapters. A number of adjustments to this cost data have already been noted. These adjustments are primarily focused upon achieving representative capital costs for each of the carriers involved. A summary of changes that were required is as follows:

- Marine Atlantic cost figures do not normally include depreciation expenses since all capital expenditures are funded directly by the federal government. Depreciation expenses have been added;

- Northumberland Ferries utilize federal government terminal facilities at no charge. In consultation with Transport Canada a representative depreciation expense has been formulated;

- BC Ferries have also extended their amortization period for vessels and terminals in their 1990-91 fiscal year resulting in much lower depreciation expenses ($17 million less than what would have been charged with previous useful lives). The average useful life of a vessel was extended from 25 years to 40 years, for instance. Since this would appear to be a significant departure from the previous year and the practice of other companies in the industry (Marine Atlantic vessel life assumed to be 20 years), a decision to add $17 million to the 1990-91 cost base of BC Ferries was made.

- A significant amount of public money has been advanced to all three service operators to undertake major capital purchases. A representative estimate of the current value of these advances has been made. An annual cost of capital amounting to 10 percent of the existing capital value has been added to 1990 expenses for all three operators. In subsequent cost displays, this cost element has been combined with depreciation expenses.

In addition to corporate wide costs, the analysis which follows will require utilization of cost and operating data for individual routes on both east and west coasts. Marine Atlantic route cost information presented in Table 2.3 will require the addition of depreciation expense and expenses related to head office administration. The latter item will be prorated based on total direct operating costs. The BC Ferries route cost information contained in Table 4.5 will also require two adjustments. Depreciation expenses will be increased as discussed above and overhead expenses need to be increased by an amount equal to net financing income. The overhead expense increase will be apportioned according to reported overhead allocations.

5.3 Separation of Freight/Passenger Activity and Cost Elements

In their role as marine bridges between highway segments, ferry services provide transportation to freight and passenger movements simultaneously. The determination of activity measures and the respective allocation of costs for each traffic element can be open to interpretation.

Deck space utilization can be recorded in a number of ways with the most common ones being lane metres and auto equivalents. While either method may not be entirely useful in situations where deck height can be a constraining factor, they do allow for relatively easy tabulation of combined freight and passenger traffic elements. In the calculations which follow, **auto equivalent units have been used to measure deck space utilization.**

A straight proration of costs based on deck space utilization can be argued against on the basis that it doesn't necessarily account for the actual costs of moving each traffic element. For instance, some have suggested that the original, or primary, objective of a service be defined in terms of either freight or passenger traffic. The incremental costs of handling the second traffic element can then be determined. While this approach may be appealing in some circumstances, it is extremely difficult to apply and has little use when the primary objective of a service is to handle both traffic elements. **Cost allocations for the ferry services being analyzed will be based on deck space occupied by respective traffic elements.**

5.4 Passenger Traffic Demand Measurement

Ferry services move passengers and passenger vehicles over routes of measurable length. **The passenger traffic measure which will be the focus of the following analysis will be passenger vehicle kilometres provided by particular ferry services**. Since not all routes can accommodate vehicles and since it is not always easy to calculate trip distances for traffic on routes with multiple stops the calculations involved will be restricted to routes where both distances and traffic are readily measurable.

5.5 Development of Unit Costs

During the consultation phase of this study, cost data for four key operating areas within each company was collected. Expenses related to vessels, terminals, administrative overhead and depreciation were provided for each individual route within a particular company's operation. The data has been adjusted as noted in Section 5.3 and 5.4 to produce an estimate of costs that can be attributed to passenger movements only.

At the same time, passenger vehicle kilometres have been calculated where identifiable distances and traffic data permit. Because of difficulties in determining distances travelled and the types of services involved (i.e. coastal freight, or passenger only), the following specific routes have been excluded from the costing exercise:

- Marine Atlantic
  - Newfoundland Coastal Service
- BC Ferries
  - Langdale/Gambier/Keats Island
  - Swartz Bay/Outer Gulf Islands
  - Tsawwassen/Gulf Islands
  - Chemainus/Thetis Island/Kuper Island

- Port McNeil/Albert Bay/Sointula

In aggregate however, approximately 89 percent of BC Ferries cost base and approximately 80 percent of Marine Atlantic's cost base are retained for further analysis. All of Northumberland Ferries data is suitable for costing and demand measurement purposes.

Tables 5.1 and 5.2 display the results of the costing process for both east coast and west coast situations on a route by route basis. It should be noted that the intermediate steps which involved the calculation of passenger related costs and passenger vehicle kilometres produced have not been illustrated due to the quantity of data involved. The unit costs were however developed from the following process:

- Auto equivalents for both truck and passenger traffic were calculated in the first phase of the study;

- Cost elements were reduced by the ratio of passenger auto equivalents to total auto equivalents; and

- Passenger auto equivalents kilometres moved were then divided into passenger costs to produce costs per passenger auto equivalent kilometre.

Immediately evident from an inspection of the detailed unit costs, is the wide variation from route to route. While some possible explanations for these differences will be explored in subsequent sections, scale factors are obviously affecting the costs of smaller services on both the east and west coasts. The relatively small Denman Island to Hornby Island crossing for instance, delivers a passenger vehicle kilometre for a total of $11.11.

Table 5.1
East Coast Ferry Passenger Unit Costs

Service	Cost Elements ($/Passenger Vehicle Kilometre)				
	Vessels	Terminals	Administration	Depreciation and Cost of Capital	Total
Marine Atlantic					
North Sydney to Port aux Basques	$0.74	$0.38	$0.20	$0.47	$1.79
North Sydney to Argentia	$0.65	$0.06	$0.12	$0.32	$1.15
Borden to Cape Tormentine	$1.62	$0.33	$0.32	$0.55	$2.82
Saint John to Digby	$0.94	$0.36	$0.22	$0.21	$1.73
Yarmouth to Bar Harbour	$1.63	$0.24	$0.31	$0.34	$2.52
* Total	$1.04	$0.29	$0.23	$0.42	$1.98
Northumberland Ferries					
Wood Islands to Caribou	$1.67	$0.10	$0.09	$0.42	$2.28

* Total calculated from aggregate costs and total passenger vehicle kilometers.

Table 5.2
1990 West Coast Unit Costs: BC Ferries
($ per Passenger Vehicle Kilometre)

Service	Vessels	Terminals	Administration	Depreciation & Cost of Capital	Total
Vancouver Island/Mainland					
Tsawwassen/Swartz Bay	$0.37	$0.14	$0.10	$0.14	$0.75
Horseshoe Bay/Nanaimo	$0.33	$0.09	$0.08	$0.07	$0.57
Tsawwassen/Nanaimo	$0.44	$0.05	$0.11	$0.08	$0.68
Subtotal	$0.36	$0.11	$0.09	$0.11	$0.67
Sunshine Coast					
Horseshoe Bay/Langdale	$0.46	$0.24	$0.13	$0.16	$0.99
Saltery Bay/Earl's Cove	$0.92	$0.33	$0.26	$0.11	$1.62
Horseshoe Bay/Bowen Island	$1.12	$0.46	$0.32	$0.26	$2.16
Langdale/Gambier & Keats Is.	–	–	–	–	–
Comox/Powell River	$1.41	$0.24	$0.36	$0.16	$2.17
Powell River/Texada	$2.21	$0.52	$0.61	$0.91	$4.25
Subtotal	$0.72	$0.27	$0.20	$0.18	$1.37
Gulf Islands					
Swartz Bay/Saltspring	$1.04	$0.38	$0.26	$0.19	$1.87
Crofton/Saltspring	$1.58	$0.37	$0.43	$0.12	$2.50
Brentwood/Mill Bay	$4.58	$1.75	$1.01	$1.11	$8.45
Swartz Bay/Outer Gulf Islands	–	–	–	–	–
Swartz Bay/Outer Gulf Islands	–	–	–	–	–
Tsawwassen/Gulf Islands	–	–	–	–	–
Subtotal	$1.28	$0.43	$0.32	$0.22	$2.25
Mid and North Island					
Nanaimo Harbour/Gabriola Is.	$0.87	$0.34	$0.28	$0.28	$1.77
Chemainus/Thetis Is./Kuper Is.	–	–	–	–	–
Buckley Bay/Denman Island	$2.50	$1.13	$0.70	$1.12	$5.45
Denman Island/Hornby Island	$5.56	$1.31	$1.46	$2.78	$11.11
Campbell River/Quadra Island	$1.88	$1.72	$0.60	$1.17	$5.37
Quadra Island/Cortes Island	$2.66	$0.23	$0.68	$1.01	$4.58
Prt McNeill/Alert Bay/S'tula	–	–	–	–	–
Subtotal	$1.70	$0.80	$0.50	$0.78	$3.78
Mid and North Coast					
Prince Rupert/Skidegate	$1.68	$0.39	$0.37	$0.26	$2.70
Skidegate/Alliford Bay	$2.17	$0.13	$0.50	$0.60	$3.40
Bear Cove/Bella Bella/Pr. Rpt.	$0.93	$0.19	$0.19	$0.29	$1.60
Subtotal	$1.13	$0.23	$0.24	$0.29	$1.89
Total	$0.49	$0.15	$0.13	$0.14	$0.91

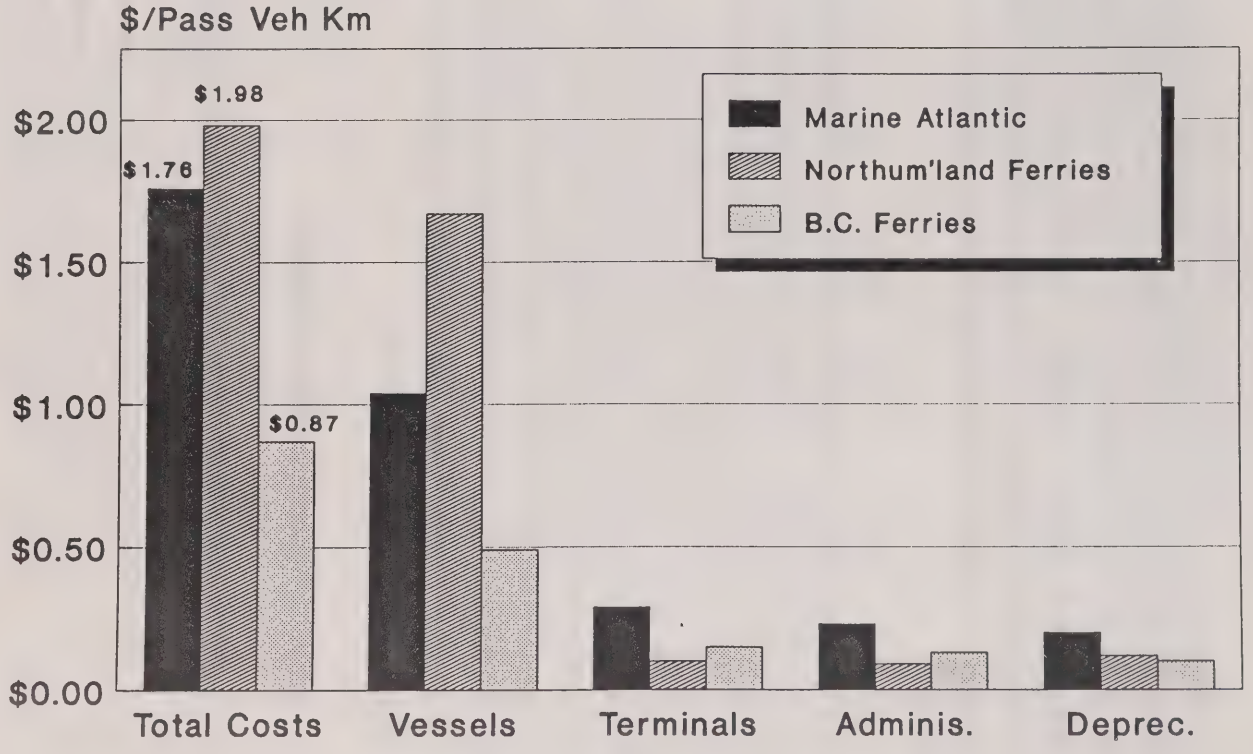
This compares with a cost of only $.67 per kilometre for all of services within the Vancouver Island/Mainland subset. On the east coast, both the Borden to Cape Tormentine, and Yarmouth to Bar Harbor services, have rather high delivery costs of $2.82 and $2.52 per passenger vehicle kilometre respectively. The 519 kilometre crossing from North Sydney to Argentia produces the lowest cost of all east coast services. It would appear that cost advantages of sharing a terminal at North Sydney are assisting the Argentia service in this comparison.

A general overview of the total corporate costs for all three ferry operators is contained in Figure 5.1. In broad terms it is shown that ferry passenger costs are roughly double on the east coast compared to the operations of BC Ferries. This relationship holds true for all the individual cost categories for which information is available. It must be noted that on a weighted average basis, the single largest contributor to the BC Ferries unit cost calculation is the Vancouver Island/Mainland (VI/M) group of services. Fully 80 percent of the passenger output at BC Ferries is offered by the VI/M group. The VI/M total is furthermore 3.5 times larger than the entire output of Marine Atlantic. If one removes the VI/M services from the evaluation, the remaining BC Ferries services generate a passenger vehicle kilometre cost of $1.81 which is very similar to east coast operations. An examination of other possible reasons for the large differences in costs follows.

5.6 Traffic Peaking and Capacity Utilization

References to the very different traffic peaking characteristics experienced on the east and west coasts has already been noted in the background information provided in previous chapters. Peak season activity, as defined by the volume of passenger auto equivalents moved in July and August, represents about 40 percent of total annual passenger traffic for Marine Atlantic. The comparable figure for a representative group of BC Ferries services

Figure 5.1
Comparison of Passenger Unit Cost Elements



is about 22 percent. The relatively even distribution of traffic through the year on the west coast contributes to a much more effective utilization of vessel space provided. Table 5.3 provides a comparative statement of capacity utilization, or load factors, for both Marine Atlantic and BC Ferries.

Northumberland Ferries are operating at a load factor of approximately 75 percent. It should be noted that the relatively high cost east coast operations in the Bay of Fundy and Prince Edward Island have the two lowest utilizations in the Marine Atlantic system. Similarly the Tsawwassen to Swartz Bay and Nanaimo to Horseshoe Bay routes, the two largest services in the VI/M grouping are among the most effectively utilized with respective load factors of 86 percent and 67 percent.

The implications for unit cost calculations are fairly straight forward, the more effectively space is utilized, the lower unit costs will be for traffic carried. Ferry vessels on the east coast are constructed with the objective of addressing peak season traffic conditions (which are much more pronounced than on the west coast). In the non-peak season when minimum levels of service, or schedules, are the determining factor for the number of trips provided, capacity utilization declines. This occurs despite some schedule deterioration in the off season. For instance during the winter, there are only two crossings daily to Newfoundland and the Prince Edward Island sailing frequency decreases to one and one half hours from a peak season frequency of a sailing every hour. From the above discussion, it is evident that lower capacity utilizations on the east coast contribute to higher values for passenger vehicle kilometre costs compared to BC Ferries.

Table 5.3
Comparative Load Factors

MARINE ATLANTIC		BC Ferries	
Service	Load Factor	Service	Load Factor
N.S/P.A.B	57.5	Tsaw/S.Bay	86.0
N.S./Argentia	62.0	Nan/H. Bay	67.0
Cape T./Borden	52.3	H.Bay/Langdale	58.0
St. John/Digby	59.6	G.Island/Tsaw.	49.0
Yar./B.Harbor	47.2	P.Rupert/Skid.	75.0

5.7 Labour Costs

Labour force costs and overheads are contained in terminal, vessel and administration cost categories discussed above. They have not been obtained as a separate cost element on a route by route basis. They are available, however, on a total corporate basis for all three operators. Total labour force costs in the 1990 operating year for Marine Atlantic, Northumberland Ferries (1990/91), and BC Ferries (1990/91) were; $108.1 million, $7.5 million, and $146.7 million respectively. Using the common cost base developed in this chapter, labour force costs as a share of total operating costs range from 44 percent for Marine Atlantic to approximately 52 percent for Northumberland Ferries. BC Ferries labour costs amount to 55 percent of total operating expenses.

Labour force expenses expressed in the above manner offer some insight into whether labour may be boosting unit passenger vehicles costs on the east coast compared to BC Ferries. They appear not to be a contributing factor at least for the BC Ferries/Marine Atlantic differential.

In order to further investigate the labour force cost component, wage rates for 1990 by employee category were gathered for each of the operators being examined. These have been displayed in Table 5.4. The high cost labour wage in all instances occurs at BC Ferries with Northumberland Ferries having the lowest wage rate in all cases. On average B.C. Ferries wages are 11 percent higher than those of Marine Atlantic and 21 percent higher than those of Northumberland Ferries. It may be concluded therefore that wage rates do not appear to be contributing to east coast/west coast unit cost differentials.

5.8 Operating Conditions

Operating conditions on the west coast are in general terms much more benign than those experienced on the east coast, particularly during the winter operating season. It has already been mentioned that winter operating conditions to Newfoundland and Prince Edward Island require ice strengthened vessels. No such requirement exists in British Columbia. While it is difficult to precisely attach a cost to the incremental cost of vessel ice strengthening, it will be present in the initial capital cost and, as a result of more vessel weight, inherent in everyday operating conditions as well.

Table 5.5 is an illustration of some key environmental criteria for relevant locations on Canada's east and west coasts. Winter and summer period conditions are displayed. The Strait of Georgia between Vancouver Island and the Mainland has the lowest average wind speeds and wave heights of any of the locations being examined for both January and July periods. The Queen Charlotte Sound, in northern British Columbia, however, has environmental conditions comparable to the Bay of Fundy in terms of wind speeds and wave heights. It should be noted though that the bulk of BC Ferries operations are conducted in

Table 5.4
Comparison of Weekly Wage Rates

Employee Categories	Marine Atlantic	Northumberland Ferries	BC Ferries
Chief Officer	$756	$703	$859
Second Officer	$681	$657	$793
Third Officer	$647	–	$795
Second Officer	$756	–	$859
Third Engineer	$671	$655	$788
Bosun	$560	$504	$615
Quarter Master	$547	$495	$589
Able Seaman	$536	$495	$589
Ordinary Seaman	$525	$495	$578
Chief Cook	$614	$473	$672
Oiler	$536	$489	$561

N.B. wages are rounded to the nearest dollar.
Employee titles differ amongst companies.

Table 5.5
Comparative Environmental Criteria

Environmental Criteria	East Coast				West Coast			
	South Newfoundland		Bay of Fundy		Queen Charlotte Sound		Strait of Georgia	
	Jan	July	Jan	July	Jan	July	Jan	July
Wind Direction	W	SSW	WNW	SW	SSE	NW	ESE	WNW
Wind Speed (knots)								
Mean	20-22	12	17-20	10-12	16-18	10-12	10-12	< 10
> 34 KN	15%	1%	10%	1%	8%	< 1%	4%	< 1%
> 48 KN	2%	-	1%	-	1%	-	0.2%	-
Wave Height								
< 2 m	60%	90%	70%	> 90%	50%	80%	> 80%	> 90%
> 6 m	2-5%	-	< 1%	-	4%	-	-	-
Visibility								
< 0.5 NM	5%	10-30%	5%	20-30%	3%	4%	< 1%	2%
Good	60%	60%	60%	60%	70%	85%	90%	> 90%

Notes
i) Good visibility is visibility > 2.5 NM and windspeed < 25 KN.
ii) Source - Atmospheric Environment Service

the southern part of the province. Here, operating conditions are much more gentle than those experienced on the east coast. Cost savings from a less severe operating environment result from: less capital intensive shore infrastructure, reduced vessel operating expenses, and diminished cancellations.

In short, while difficult to quantify, the combination of an ice free environment and gentler ambient conditions will assist the west coast ferry operations in achieving lower service costs.

5.9 Administration

Total administrative costs for Marine Atlantic and BC Ferries in 1990 are estimated at $28.7 million and $37.6 million respectively. As a percentage of total costs the Marine Atlantic administrative component is 11.6 percent while that for BC Ferries is 14.3 percent. Both companies manage a diverse group of ferry services contained in wide geographic zones. Northumberland Ferries on the other hand expends, approximately $.6 million a year on administering its service from Wood Islands, P.E.I. to Caribou, N.S. This equates to about 3.9 percent of total operating costs. (It should be noted that Marine Atlantic eliminated 60 administrative positions in early 1991 which would not be reflected in the above cost numbers.)

From this simple comparison, one may legitimately ask whether there may be some administration diseconomies of size in both Marine Atlantic and BC Ferries. Certainly one of the contributing factors to elevation of administration is the geographic separation of important services. This has the inevitable tendency to encourage secondary levels of management at non-headquarters locations. It is not intended to imply that these secondary positions are wasteful, or even unnecessary, merely that they occur. The geographic dispersion factor will also contribute to greater transportation and communication costs related to management activities.

As Crown Corporations, albeit with different levels of government as owners, both Marine Atlantic and BC Ferries, have what can be termed greater public profiles. This causes a need in both corporations to respond to governmental control systems which would not be present in most private sector situations. This administrative requirement is likely to be more onerous as the degree of reliance upon public funds increases. While this factor does cause extra administrative burdens in both Marine Atlantic and BC Ferries, it is impossible to quantify.

In summary, relative to the small privately run operations of Northumberland Ferries, administrative costs at Marine Atlantic and BC Ferries appear to be high. Some of the difference is attributable to the geographic dispersion of services at both Marine Atlantic and BC Ferries and some may be explained by the higher public profiles of the latter two corporations.

5.10 Summary and Conclusions

The development of unit costs and examination of factors which may be contributing to variances among service operators has produced some interesting results. It would be prudent to summarize key points before proceeding further:

- Costs per passenger vehicle kilometres moved on ferry services varies widely among individual routes and the particular operators being examined. Both the highest ($11.11/pvk) and the lowest ($.57/pvk) cost routes offered by BC Ferries;

- Passenger costs for the total of Marine Atlantic services ($1.98/pvk) are approximately double those of the BC Ferries system ($.91/pvk). Northumberland Ferries costs are $2.28/pvk.

- The three Vancouver Island/Mainland (VI/M) services which effectively connect the heavily populated southern British Columbia mainland with the provincial capital and the remainder of southern Vancouver Island, dominate ferry passenger output within BC Ferries (80 percent of total pvk's produced). This service grouping along provides 3.5 times more passenger activity than all of Marine Atlantic.

- Excluding the VI/M "super ferry service" grouping, BC Ferries system costs are $1.81/pvk which is very similar to costs experienced on the east coast;

- High cost east coast services such as Borden/Cape Tormentine ($2.82/pvk) and Yarmouth/Bar Harbor ($2.52/pvk) have relatively low annual capacity utilization factors. The VI/M grouping, on the other hand, has an extremely high annual utilization of capacity. In general terms, B.C. Ferry services have higher load factors which are supported by a much more even seasonal distribution of traffic than which occurs on the east coast;

- In terms of labour wage rates, BC Ferries are an average of 11 percent higher than those of Marine Atlantic and 21 percent higher than those of Northumberland Ferries. Wage rates do not appear to be contributing to higher units costs on the east coast;

- Operating conditions are much more kind on the west coast compared to eastern Canada. In addition to operating in an ice free environment, general ambient conditions for most of BC Ferries services are considerably gentler than those encountered by Marine Atlantic and Northumberland Ferries. This contributes to reduced vessel and shore infrastructure capital costs as well as reduced operating and maintenance expenditures; and

- Administrative expenses at both Marine Atlantic and BC Ferries appear high relative to Northumberland Ferries. Some of the difference can be explained by the geographic coverage required for each of the larger corporations. As well as Crown Corporations both Marine Atlantic and B.C Ferries have reporting relationships not required by most private operators.

The above points with respect to the three ferry operators being examined illustrate some major differences between ferry services on Canada's east coast compared to those in British Columbia. Following a consideration of revenue features of each of the operators, an attempt will be made to create an east coast service model which will have traffic and operating conditions similar to those in southern British Columbia. In this fashion, a fairer comparison of unit costs may result.

6.0 UNIT REVENUE DEVELOPMENT AND ANALYSIS

6.1 Introduction

The previous chapter established the basic delivery costs of ferry passenger traffic. The purpose of this section is to conduct a similar assessment of ferry passenger revenue. After unit revenue figures have been determined, they will be compared to unit costs to produce "cost recovery" ratios. Where cost recovery is not achieved, revenue enhancement scenarios will be developed. The implications that some large rate increases could have upon traffic will be considered.

6.2 Segregation of Passenger and Freight Revenue

Passenger and commercial vehicle revenue figures were obtained during consultations with ferry corporations. Revenue for ancillary vessel and terminal services was also obtained. The components of ancillary revenue which could not be directly affiliated with passenger or commercial **vehicles**, has been assigned to each traffic element based on the assumed percentage of passengers brought onto vessels. For instance, it was assumed that each live freight vehicle carried 1.1 passengers (including the driver). If the freight component was estimated to have 10 percent of total passengers, revenue associated with meals, accommodations, and other such services was assigned to the freight element on this basis.

6.3 Development of Unit Revenues

The output measure of passenger vehicle kilometres (pvk's) moved by the respective ferry service operators, has been retained to express revenue earnings for particular routes. The services noted in Section 5.5 for which identifiable distances or traffic measures could not be obtained have not been included in the revenue analysis. However approximately 92 percent

of the Marine Atlantic commercial revenue base and approximately 96 percent of the BC Ferries commercial revenue base are encompassed in the remaining services. Three basic summary categories of revenue are developed for each service and operator. The respective revenue categories along with a brief description of what is contained in each follows:

- Transportation - revenue forthcoming from the direct movement of passengers and passenger related vehicles. Discounts or premiums that may be offered to certain traffic elements have been accounted for;

- Vessel/terminals - net revenue associated with on board meals, amusement machines and concessions; and

- Other - includes revenue from such sources as currency exchange, on shore parking and equipment rentals.

Table 6.1 and 6.2 contain 1990 revenue per passenger vehicle kilometre by revenue category, by route, and by service operator. In all instances, the largest component of revenue is that associated with charges for the direct movement of passengers and vehicles. This so called transportation revenue amounts to approximately 75 percent of all commercial revenue generated by Marine Atlantic and 85 percent of commercial revenue earned by BC Ferries. Revenue forthcoming from the sale of meals, and other on board services, accounts for almost all of the remaining passenger revenue.

An interesting exception to this statement is the Yarmouth to Bar Harbor service, where favourable currency exchange and cross charges to Prince of Fundy cruises (a privately run ferry service) for the usage of facilities, produce a relatively large amount of other revenue.

Table 6.1
East Coast Ferry Passenger Unit Revenues

Service	Revenue Component ($/Passenger Vehicle Kilometre)			
	Transportation	Vessel/Terminal Services	Other	Total
Marine Atlantic				
North Sydney to Port aux Basques	$0.44	$0.19	$0.01	$0.64
North Sydney to Argentia	$0.34	$0.14	$0.00	$0.48
Borden to Cape Tormentine	$0.87	$0.25	$0.00	$1.12
Saint John to Digby	$1.35	$0.09	$0.01	$1.45
Yarmouth to Bar Harbor	$0.77	$0.32	$0.16	$1.25
*Total Marine Atlantic	$0.63	$0.20	$0.02	$0.85
Northumberland Ferries				
Wood Islands to Caribou	$0.85	$0.15	$0.01	$1.01

* Total calculated from aggregate volumes and total passenger vehicle kilometres

Table 6.2
1990 West Coast Unit Revenues: BC Ferries
($ per Passenger Vehicle Kilometre)

Service	Transportation	Vessel/Terminal Services	Other	Total
Vancouver Island/Mainland				
Tsawwassen/Swartz Bay	$0.71	$0.13	$0.02	$0.86
Horseshoe Bay/Nanaimo	$0.53	$0.09	$0.01	$0.63
Tsawwassen/Nanaimo	$0.45	$0.13	–	$0.58
Subtotal	$0.61	$0.11	$0.01	$0.73
Sunshine Coast				
Horseshoe Bay/Langdale	$0.72	$0.09	–	$0.81
Saltery Bay/Earl's Cove	$0.78	$0.06	–	$0.84
Horseshoe Bay/Bowen Island	$1.26	–	–	$1.26
Langdale/Gambier & Keats Is.	–	–	–	–
Comox/Powell River	$0.95	$0.08	–	$1.03
Powell River/Texada	$0.53	–	–	$0.53
Subtotal	$0.78	$0.08	–	$0.86
Gulf Islands				
Swartz Bay/Saltspring	$0.73	–	–	$0.73
Crofton/Saltspring	$1.66	–	–	$1.66
Brentwood/Mill Bay	$3.84	–	–	$3.84
Swartz Bay/Outer Gulf Islands	–	–	–	–
Swartz Bay/Outer Gulf Islands	–	–	–	–
Tsawwassen/Gulf Islands	–	–	–	–
Subtotal	$1.02	–	–	$1.02
Mid and North Island				
Nanaimo Harbour/Gabriola Is.	$0.60	–	–	$0.60
Chemainus/Thetis Is./Kuper Is.	–	–	–	–
Buckley Bay/Denman Island	$1.09	–	–	$1.09
Denman Island/Hornby Island	$1.71	–	–	$1.71
Campbell River/Quadra Island	$1.24	–	–	$1.24
Quadra Island/Cortes Island	$0.50	–	–	$0.50
Prt McNeill/Alert Bay/S'tula	–	–	–	–
Subtotal	$0.85	–	–	$0.85
Mid and North Coast				
Prince Rupert/Skidegate	$0.61	$0.18	–	$0.79
Skidegate/Alliford Bay	$0.62	–	–	$0.62
Bear Cove/Bella Bella/Pr. Rpt.	$0.74	$0.16	–	$0.90
Subtotal	$0.71	$0.15	–	$0.86
Total	$0.64	$0.11	$0.01	$0.76

Similar to the situation evident in unit costs, there are considerable variances in unit revenues among services operating on both east and west coasts. Revenue/pvk for Marine Atlantic in aggregate is $.85. Contributing to this figure however are the North Sydney to Argentia service at $.48/pvk and the Saint John to Digby service at $1.25/pvk. Revenue figures for BC Ferries range from $.50/pvk for the Quadra Island/Cortes Island service to $3.84/pvk for the Brentwood Bay/Mill Bay route. The very heavily travelled trunk routes involved in the Vancouver Island/Mainland (VI/M) service grouping produce a revenue of $.73/pvk which is very close to the system wide average of $.76/pvk. Revenue for BC Ferries routes excluding the VI/M services is approximately $.83 per passenger vehicle kilometre.

The revealing conclusion from the above discussion is that revenue, per unit of delivery, is very similar between east and west coast operators. In order of ascending magnitude, the unit revenues are; $.76/pvk for BC Ferries, $.85/pvk for Marine Atlantic and $1.01/pvk for Northumberland Ferries.

Before analyzing possible options for the development of future revenue scenarios, it is certainly of value to compare unit revenues with unit costs. This is accomplished in the next section.

6.4 Passenger Cost Recovery Ratios

It will be recalled from the discussion on unit costs in the previous chapter that system wide unit passenger costs for Marine Atlantic were approximately double those of BC Ferries. When unit revenues, developed above, are considered against unit costs, the portion of total costs covered by revenues, or the cost recovery ratio, results. Tables 6.3 and 6.4 combine cost and revenue figures to produce costs recovery ratios for all three operators. In addition, the factor by which overall revenue would have to be changed by, in order to exactly equal costs, or the break even factor, is also calculated.

Cost recovery ratios for Marine Atlantic services range from a low of .36 for the constitutional crossing to Newfoundland to a high of .84 for the Saint John to Digby crossing of the Bay of Fundy. The cost recovery ratio for all of Marine Atlantic services is .43. The situation in British Columbia is considerably different. The VI/M group of services have revenue in excess of costs. The two largest services in this grouping, the Tsawwassen to Swartz Bay route and the Horseshoe Bay to Nanaimo route have respective cost recovery ratios of 1.15 and 1.10 respectively. The picture in the remaining BC Ferries services is similar to the east coast situation. As a group, the non VI/M services, have a cost recovery of approximately .46. Contributing to this are the Quadra Island/Cortes Island service (cost recovery of .11) and the Horseshoe Bay/Langdale service (cost recovery of .82).

It is apparent then that the overall financial situation of BC Ferries is enhanced by the favourable cost recovery resulting from the VI/M services. These services effectively cross subsidize activities elsewhere. Despite the very large contributions of the VI/M grouping to the bottom line of BC Ferries, the corporation does not break even on passenger revenues versus passenger costs. The overall cost recovery ratio is .84.

It must further be remembered that virtually all of the services in question, whether located on the east or west coast, also provide transportation to the freight element. Corporate cost recovery will depend on the revenue obtained from both passenger and freight activity. Some commentary with respect to possible cross subsidization between traffic components will be provided in a subsequent section.

Table 6.3
Passenger Cost Recovery Ratios by Service
East Coast

Service	Total Unit Revenue	Total Unit Cost	Cost Recovery Ratio	Break Even Factor
Marine Atlantic				
North Sydney to Port aux Basques	$0.64	$1.54	0.42	2.4
North Sydney to Argentia	$0.48	$0.98	0.49	2.0
Borden to Cape Tormentine	$1.12	$2.53	0.44	2.3
Saint John to Digby	$1.45	$1.62	0.90	1.1
Yarmouth to Bar Harbor	$1.25	$2.34	0.53	1.9
*Total	$0.85	$1.76	0.48	2.1
Northumberland Ferries				
Wood Islands to Caribou	$1.01	$1.98	0.51	2.0

* Total calculated from aggregate revenues and total passenger vehicle kilometers

Table 6.4
Passenger Cost Recovery Ratios by Service
West Coast

Service	Total Unit Revenues	Total Unit Costs	Cost Recovery Ratio	Break Even Factor
Vancouver Island/Mainland				
Tsawwassen/Swartz Bay	$0.86	$0.75	1.15	0.9
Horseshoe Bay/Nanaimo	$0.63	$0.57	1.10	0.9
Tsawwassen/Nanaimo	$0.58	$0.68	0.85	1.2
Subtotal	$0.73	$0.67	1.09	0.9
Sunshine Coast				
Horseshoe Bay/Langdale	$0.81	$0.99	0.82	1.2
Saltery Bay/Earl's Cove	$0.84	$1.62	0.52	1.9
Horseshoe Bay/Bowen Island	$1.26	$2.16	0.58	1.7
Langdale/Gambier & Keats Is.	-	-	-	-
Comox/Powell River	$1.03	$2.17	0.47	2.1
Powell River/Texada	$0.53	$4.25	0.12	8.3
Subtotal	$0.86	$1.37	0.63	1.6
Gulf Islands				
Swartz Bay/Saltspring	$0.73	$1.87	0.39	2.6
Crofton/Saltspring	$1.66	$2.50	0.66	1.5
Brentwood/Mill Bay	$3.84	$8.45	0.45	2.2
Swartz Bay/Outer Gulf Islands	-	-	-	-
Swartz Bay/Outer Gulf Islands	-	-	-	-
Tsawwassen/Gulf Islands	-	-	-	-
Subtotal	$1.02	$2.25	0.45	2.2
Mid and North Island				
Nanaimo Harbour/Gabriola Is.	$0.60	$1.77	0.34	2.9
Chemainus/Thetis Is./Kuper Is.	-	-	-	-
Buckley Bay/Denman Island	$1.09	$5.45	0.20	5.0
Denman Island/Hornby Island	$1.71	$11.11	0.15	6.7
Campbell River/Quadra Island	$1.24	$5.37	0.23	4.3
Quadra Island/Cortes Island	$0.50	$4.58	0.11	9.1
Prt McNeill/Alert Bay/S'tula	-	-	-	-
Subtotal	$0.85	$3.78	0.22	4.5
Mid and North Coast				
Prince Rupert/Skidegate	$0.79	$2.70	0.29	3.4
Skidegate/Alliford Bay	$0.62	$3.40	0.18	5.6
Bear Cove/Bella Bella/Pr. Rpt.	$0.90	$1.60	0.56	1.8
Subtotal	$0.86	$1.89	0.46	2.2
Total	$0.76	$0.91	0.84	1.2

6.5 Revenue Development

Notwithstanding the fact that unit revenues on the east coast are already at levels higher than those occurring on the west coast, it remains that cost recovery both at Marine Atlantic and Northumberland Ferries is low. In monetary terms, combined operating subsidies for both freight and passenger movements to the two companies approximated $127 million in 1990. From an economic efficiency perspective, it would generally be advisable to reduce such distortions from the market place.

The attainment of cost recovery, strictly from revenue enhancement, for east coast services will be a daunting task. This follows from the fact that overall revenues would need to be at least doubled over present values. Furthermore, since all east coast services are, to varying degrees, below cost recovery, each will require specific attention. It is not the objective of this exercise to attempt a service specific revenue enhancement blueprint. What is of relevance however is an examination of the factors and mechanisms that can contribute to greater cost recovery. A listing of these is as follows:

- Policy/political constraints;
- Price elasticity of demand; and
- Specific revenue enhancement tools.

Each is discussed below.

6.5.1 Policy/Political Constraints

The rates charged for ferry services is an extremely sensitive issue amongst all of the operators being examined. The federal government approves the rates charged by Marine Atlantic and Northumberland Ferries while the province of British Columbia has a similar role with BC Ferries. Until recently, this has resulted in periods where no rate increases would be sought followed by large catch up increases when lack of rate action could no longer be justified. In recent years, annual rate increases, to correspond to inflationary pressures, have replaced the spasmodic approach of the prior period. In recognition of low cost recoveries, the federal government has encouraged east coast operators to achieve inflation plus 1 or 2 percentage points in their annual rate increases.

Despite the anticipation of annual increases, a number of lobby groups representing various industry sectors and interests seek consideration in the setting of rates. In addition, the ferry services operated by Marine Atlantic to Borden, P.E.I and Port aux Basques, Nfld., as federal constitutional commitments to each of the Island provinces, are subject to intense scrutiny by provincial government representatives. In general terms the establishment of ferry rates is a high profile process. Substantive increases can be expected to draw a great deal of attention.

6.5.2 Price Elasticity of Demand

Normal price/demand relationships anticipate a change in quantity demand as the price sought for that item changes. The ratio of percentage change in quantity demanded divided by the percentage change in price is called the price elasticity of demand. Put more simply, particularly with respect to attempting to achieve cost recovery through the increase of ferry rates, the more prices increase, the greater will be the decline in demand. The effect upon revenue will depend upon how price elastic the existing traffic elements are. In an attempt to measure the sensitivity of ferry passenger traffic to rate increases, Marine Atlantic and

Transport Canada jointly commissioned an independent study of ferry rates in 1983. This study undertook approximately 8,000 interviews of ferry passengers distributed amongst Marine Atlantic's five main passenger services. In general terms, it confirmed that ferry passenger traffic demand would be impacted by price increases (a range of increases from 10-70 percent were tested) and the decline in demand would vary according to:

- overall trip length (first origin to last destination) - the longer the overall trip, the less it would be affected by a price increase on the ferry portion;

- vehicle type - passenger vehicles such as self-propelled campers whose rates are higher to reflect the usage of high headroom, and whose trip purposes may be more discretionary were more price sensitive; and

- trip purpose - business travellers were less price sensitive than those who were on vacation or visiting friends and relatives.

The traffic elements least impacted by a price increase were those who had the lowest nominal rates. For instance, those travelling by automobiles to Prince Edward Island who could do so for approximately $6.50 (including driver) indicated a greater willingness to continue travel than someone faced with an identical percentage price increase but whose base rates were considerably higher. This sticker shock effect was particularly noticeable on the Bay of Fundy services.

It will be recalled from Table 6.3 and 6.4 that revenue increases of at least 100 percent would be required in the majority of ferry services on both Canada's east and west coasts to achieve cost recovery. From the above discussions, it is evident that the revenue required could not be achieved from straight increases in rates without consideration of the elasticity of demand.

It is conceivable in some instances that a cost recovery revenue situation simply could not be obtained after allowance for the price sensitivity of the traffic being carried. An in-depth analysis of each ferry service would be necessary to produce a revenue maximization rate structure.

6.5.3 Revenue Enhancement Potential

All three ferry service operators actively contemplate the enhancement of existing revenue sources and the development of potential new revenue production areas. Discounts are sometimes offered to particular traffic segments where capacity and business practice dictate while premiums are sometimes sought from the sale of guaranteed loading tickets and peak season travellers.

Of all the tools that are available to service operators, the one that would appear to have the most potential is the development of peak season or peak load rates. The usage of peak season pricing is now currently employed only on Marine Atlantic's two Bay of Fundy services. Its broader application on both east and west coasts could:

- provide significant incremental revenue (within elasticity parameters discussed earlier); and

- accomplish traffic smoothing which in turn would ultimately deflect some of the capital costs associated with peak traffic levels.

Its utilization would seem to be particularly compelling on east coast services given their very marked summer peaking characteristics. For instance, a 25 percent peak season premium on passenger travel to Prince Edward Island and Newfoundland are estimated to have an annual potential of $1.0 million and $1.1 million, respectively (1990 revenue and traffic figures).

It should be noted that past attempts at imposition of peak season rates have met stiff opposition from a variety of interest groups.

BC Ferries have recently made available a guaranteed loading ticket in their VI/M crossings, which essentially ensures passage on the next scheduled sailing if the ticket holder arrives twenty minutes before departure. The tickets are sold in blocks of 10 only, and in 1990 were charged at a premium of 33 percent over a regular ticket. Because of its initial success, the premium was raised to approximately 50 percent in 1991. This concept has applicability for non-reservation type services where excess waiting time frequently occurs. Northumberland Ferries is a prime candidate for such a scheme and have made it available for the 1991 operating year. Marine Atlantic's Prince Edward Island service is the other east coast service where the guaranteed loading ticket might offer some potential. Existing waiting times at this crossing however, even in the summer months, do not suggest that there would be a substantive revenue potential involved.

Ancillary vessel services can be significant contributors to service revenue. For instance, the casino on the Yarmouth to Bar Harbor route contributed approximately $.6 million in 1990 to net revenue. Gaming machines were available on the Newfoundland crossing in the 1970's but were deemed to be illegal and were subsequently removed. With the development of regional lottery corporations and technological advances, new options for the placement of legal gambling devices on vessels may soon arise. In conjunction with the New Brunswick government, the Atlantic Loto Corporation has recently licensed gaming machines at certain convenience stores and night club locations. Nova Scotia and Newfoundland are thought to be close to implementing similar programs. This in turn could reopen the possibility of achieving revenue from this source for a variety of east coast ferry services. Total revenue potential is felt to be significant.

6.6 Freight Revenue

As has been noted at a number of junctures throughout the report, ferry services are providing transportation to both freight and passenger traffic elements. Revenue enhancement statements would be remiss without some consideration of freight revenue contributions. This is particularly true for east coast services where the percentage of overall carryings designated to be freight is much higher than that experienced by BC Ferries.

Within the accuracy afforded by the methodology utilized to derive freight and passenger costs, it is possible to determine whether each traffic element is contributing equally to cost recovery. After a comparison of total cost recoveries, and cost recoveries associated with passenger traffic only, it is apparent that freight traffic contributes proportionally less revenue. The revenue profiles of the Borden/Cape Tormentine, North Sydney/Port aux Basques, Saint John/Digby and Wood Islands/Caribou services all contain evidence of passenger revenue contributing more significantly to cost recovery than freight revenue.

6.7 Summary and Conclusions

A summary of key points revealed in the examination of unit revenues, cost recovery and revenue enhancement possibilities contained in this chapter are as follows:

- Revenue associated with the direct movement of passengers and vehicles is the dominant source of commercial revenue earned by all of the ferry service operators investigated;

- Similar to the situation evident in the costing analysis, there are considerable variances in unit revenue figures among services operating on both east and

west coasts. Unlike costs however, aggregate unit revenues are very comparable between all three operators;

- Cost recovery ratios for passenger traffic services offered by Marine Atlantic range from .36 to .84 with an system wide average of .43 being recorded. Northumberland Ferries passenger cost recovery is .44;

- BC Ferries overall passenger cost recovery is .84. The VI/M group of services, however, has a cost recovery of 1.09 which effectively cross subsidizes the revenues obtained from other services. The non VI/M services have a cost recovery of .46;

- Break even revenue levels for most east and west coast services are approximately double existing levels;

- Ferry rates are a high profile issue in all of the jurisdictions where they operate. Substantive increases can be expected to draw a great deal of attention;

- Large passenger rate increases will be met with a decline in demand, thereby making cost recovery more difficult to achieve;

- Substantive revenue enhancement could be expected by a broader application of peak season pricing on east coast services. In addition, development of new ancillary revenue sources such as gaming machines could provide welcome revenue to all services;

- Some cross subsidization of freight activity by passenger traffic is occurring on several east coast services.

7.0 A HYPOTHETICAL COMPARISON OF SELECTED BC FERRIES AND MARINE ATLANTIC SERVICES

7.1 Introduction

It has been illustrated at a number of locations in this report that the operating and traffic conditions experienced by Marine Atlantic and BC Ferries are considerably different. In an effort to provide a fairer comparison between the two companies, operating characteristics of individual services were examined. From this examination, it is apparent that Marine Atlantic's Borden to Cape Tormentine service and BC Ferries' Tsawwassen to Swartz Bay service share certain characteristics:

- Each of these services is the high volume crossing of either carrier;
- Both have non ice-strengthened vessels. Marine Atlantic's Holiday Island and Vacationland now operate in the summer and shoulder seasons only;
- The vessels employed by both carriers are of the same vintage, i.e., 20 years of age or older; and
- Neither service has a reservation system.

Three major areas of difference are present between the services chosen for review. The first area of difference is in the respective traffic profiles. The Prince Edward Island service has a much higher seasonal peak for traffic carried, essentially moving 38 percent of its passenger traffic during the months of July and August. This compares with a peaking factor

of 22 percent for Tsawwassen to Swartz Bay. In addition, virtually all (88 percent) of the traffic in the British Columbia service is passenger related. The Cape Tormentine crossing has only slightly more passenger traffic (56 percent of total movements) than commercial traffic.

As noted earlier, BC Ferries attained a very high utilization of capacity provided on the Tsawwassen to Swartz Bay route. This is partially supported by the relatively minor seasonal peaking experienced here. On an annual basis, the Swartz Bay service achieves a capacity utilization of 86 percent compared to only 52 percent for the Cape Tormentine to Borden crossing.

Finally, for a four- to five- month period every year, the service to Prince Edward Island operates in sea ice conditions. This necessitates that the vessels employed on the crossing be ice strengthened. No such requirement exists on the west coast. Capital and operating costs for ice-strengthened vessels will be higher.

Given the similarities and differences described above, a fairer comparison of the two services may be effected by hypothetically equalizing the operating environments. A suggested means of doing this is described below in point form:

- The Tsawwassen to Swartz Bay service is considered in its present form;
- The Borden to Cape Tormentine service is assumed to have:
  - its current level of traffic in auto equivalents;
  - the same seasonal distribution as Swartz Bay;
  - the same passenger/commercial traffic distribution as Swartz Bay;

- a year round ice free operating environment which will allow for a continuous deployment of the Holiday Island and Vacationland; and

- its existing revenue and cost profiles.

The remaining sections of this chapter will develop the cost and revenue implications of the hypothetical Prince Edward Island service.

7.2 Hypothetical Traffic Profile

Application of the Swartz Bay seasonal peaking factors and passenger/commercial traffic splits to the Borden-Cape Tormentine service produces a traffic profile as described in Table 7.1 It is essentially a much less seasonal traffic situation with a much higher percentage of passenger vehicles. The existing load factors in the Swartz Bay crossing are also noted.

7.3 Hypothetical Operating Plan

The Charlottetown office of Marine Atlantic was consulted to fit a new operating schedule around the new traffic numbers. Daily arrival patterns, level of service, and the provision of dangerous goods crossings were considered in their determination that the following schedule would be required to respond to the hypothetical traffic profile:

- 16 round trips per/day during the period from mid November to mid April;
- 18 round trips/day during the spring and fall;
- 24 round trips/day from mid June to early September;
- an average of 1.5 dangerous goods crossings per day.

To provide these trips, two Holiday Island/Vacationland vessels would be sufficient for the non peak operating periods. Three Holiday Island/Vacationland vessels would be required during July and August. It was further concluded that each vessel would be required to be fully crewed for a 24-hour period. This determination is largely based on a perceived need to maintain an adequate level of service throughout the operating day. As a consequence of the "schedule protection" assumption employed by Marine Atlantic, the capacity utilization of the service on an annual basis does not approach levels experienced by the Swartz Bay crossing. Load factors, however, do increase to approximately 60 percent of capacity from their current level of 52 percent.

A number of possible alternatives exist to increase utilization rates, but the most practical solution would be a degradation of sailing frequency. For instance, during certain winter periods it would be technically possible to handle all traffic offering with a single vessel. This would however create a non matching schedule at the Borden and Cape Tormentine terminals, and produce a three-hour spacing between sailings. Waiting times would be extremely long for those just missing a departure or those unable to load due to space restrictions.

7.4 New Cost Structure

The hypothetical ability to operate Holiday Island/Vacationland vessels year round produces substantive cost reductions for the Borden to Cape Tormentine service. During existing ice operations, the Abegweit and John Hamilton Gray are currently deployed with approximate per diem costs of $31,000. In addition, one of the two ice-strengthened ships is utilized for overload traffic during the summer and during maintenance periods. Comparative costs for the non ice-strengthened vessels are $18,000 per day. The resultant hypothetical vessel operating costs are $7.3 million lower for an entire operating year.

Table 7.1
Hypothetical 1990 Borden to Cape Tormentine
Traffic Profile

Month	Monthly Auto-Equivalents	Commercial Auto-Equivalents	Passenger Auto-Equivalents	Load Factors*
January	64,905	12,515	52,390	89
February	57,600	11,635	45,964	85
March	83,676	14,439	69,237	85
April	103,391	13,982	89,408	86
May	109,806	14,857	94,948	86
June	118,119	13,977	104,141	85
July	146,675	14,634	132,040	88
August	160,194	14,517	145,677	92
September	123,288	12,961	110,327	89
October	102,398	13,999	88,398	84
November	83,158	12,447	70,711	80
December	81,736	10,001	71,735	76
TOTAL	1,234,946	159,964	1,074,976	86

* Based on Tsawwassen to Swartz Bay

The utilization of the smaller and older ships to handle the traffic load at Borden to Cape Tormentine also has the effect of considerably reducing depreciation charges. A net reduction of $3.3 million in depreciation expense is accomplished in this manner.

7.5 New Revenue Structure

Marine Atlantic's 1990 revenue profile was utilized to develop transportation revenue and ancillary revenue figures per unit of service delivery. These existing unit revenues were then applied to the new traffic profile. A revenue gain of approximately $5.1 million results. Since only the allocation of passenger and commercial traffic has been changed, not the total number of auto equivalents travelling, the revenue gain is a further indication of likely difference in the revenue contributions of passenger and freight traffic elements.

7.6 Hypothetical Cost Recovery

Total commercial revenues for the new traffic profile (freight and passenger) would have totalled approximately $19.9 million in 1990. Costs, including allowance for depreciation/cost of capital and corporate administration, would have been $42.0 million. The overall service cost recovery would therefore be in the vicinity of 47 percent. This compares with an existing Borden to Cape Tormentine ratio of approximately 30 and an existing Swartz Bay ratio of 1.15. One of the key reasons for this wide variation is percentage of capacity utilized in the respective services. An increase in the load factor of the hypothetical Borden to Cape Tormentine crossing to the 85 percent level being achieved at Swartz Bay would result in an estimated incremental revenue of $8.0 million. This would boost cost recovery to the 66 percent level. In addition, if traffic warranted, the fleet proposed for the hypothetical Prince Edward Island service could make many more additional crossings. The largest incremental cost in these circumstances would be fuel.

Isolating the hypothetical passenger revenue and passenger cost components also produces a cost recovery of 47 percent. The equality between overall cost recovery and passenger cost recovery is not surprising in light of the fact that the traffic on the hypothetical service is 88 percent passenger related. An enhancement of passenger cost recovery could be achieved in the manner described in the previous paragraph. In addition, some revenue potential is achievable from the utilization of peak season pricing, although the gain would be reduced in the hypothetical situation because of its diminished peaking characteristics.

7.7 Summary and Conclusions

The essential points developed in the consideration of the Borden to Cape Tormentine service as if it shared most of the traffic and operating characteristics of the Tsawwassen to Swartz Bay service are:

- The hypothetical Borden to Cape Tormentine service has a considerably reduced seasonal peak, a much higher percentage of passenger traffic, and is able to utilize ice free vessels year round;

- The new operating fleet and schedule results in reduced service costs of $10.6 million per year;

- The new traffic profile produces an incremental transportation revenue of $5.1 million compared to the existing circumstances;

- Overall cost recovery improves to approximately 47 percent from a current level of 30 percent. This compares with a level of 115 percent for the Swartz Bay crossing;

- The hypothetical cost recovery for the Prince Edward Island service would be considerably enhanced by achievement of higher load factors and higher traffic levels in non peak periods.

8.0 FERRY VESSEL TECHNICAL ISSUES AND FUTURE DEVELOPMENTS

8.1 Introduction

This chapter seeks to outline recent developments and trends in ferry vessel technology and to provide some commentary with respect to Canadian technical and operating parameters. The discussion commences with a definition of ferry types and a description of recently constructed vessels.

8.2 Conventional Ferries

Most large ferries are conventional displacement ships, ie., they follow Archimedes principle by displacing their weight of water. A fundamental factor of displacement ships is that their maximum practical speed is a function of their length. In simplistic terms, the maximum speed in knots (nautical miles per hour) is a little greater than the square root of the length in feet. For instance, for a 400 foot ferry of the proper shape, this would be 20 knots. Even at this speed, the last two knots of speed would require as much power as the first ten knots.

Conventional ferries are constructed of steel, although in some cases their superstructure may be of aluminum. Their construction is in accordance with a variety of regulations covering strength, stability, fire prevention and control, lifesaving equipment, noise, water quality, pollution prevention, etc. In Canada, ships must meet the requirements of the Canadian Coast Guard, Ship Safety Branch. Construction in accordance with these regulations, and periodic inspection are part of the requirements of the Canada Shipping Act, and are prerequisites to obtaining and maintaining a valid certificate, which is itself required in order to legally operate a ship. In addition to ship safety inspection, most large vessels are built to the inspection requirements of a recognized classification society (Lloyds Register of Shipping (LR) and the American Bureau of Shipping (ABS) are typical examples). Building to class ensures the design, structure and machinery of the vessel meet specified standards. Many owners

Table 8.1
Conventional Ferry Characteristics

Type Passenger/Auto	Name	Year	Service	Capacity			Dimensions (m)			Tonnage		Speed (knots)	Power (kW)	Cost (millions)
				Passenger	Auto	Truck	Length	Breadth	Draft	Gross	Dead Wgt			
Double-Ended	-	1991	Moss/Horton Oslo Fjord 10 km	700	125	25	120	19.0	-	-	1,700	15.0	5,200	-
Cross Channel	Olau Hollandia	1989	Sheerness/ Vlissengen 200 km	1,600	575	122	161	29.0	6.3	-	4,365	21.3	20,000	$120
Cross Channel	Fantasia	1980 *1989	Dover/Calais 40 km	1,800	720	107	163	38.0	6.5	25,100	-	-	-	$50
Baltic Cruise	Silja Serenade	1991	Sweden/Finland	2,500	450	60	203	31.5	6.5	58,376	3,500	21.0	32,500	-
Long Distance	Bretagne	1989	England/Spain France/England France/Ireland	2,030	600 180	- 60	153	26.0	6.2	22,500	-	21.0	-	-
Cross Channel	European Seaway	1991	English Channel	200 truck drivers	-	120	180	27.8	6.0	20,600	4,600	21.0	21,000	$100
Cross Channel	Stena Challenger	1991	English Channel	500 120 truck drivers	-	95	154	24.0	5.5	18,500	4,600	17.5	10,500	$70
Cdn. East Coast	Smallwood	1990	Cabot Strait	1,200	350	or 91 T.T.'s	179	25.0	6.6	27,200	3,662	23.0	21,000	$150
Cdn. West Coast	B.C. Superferry	1993	Strait of Georgia	2,000	470	-	168	27.5	5.0	11.445	-	19	15,600	$130
Cdn. West Coast	Queen of Victoria	1962	Strait of Georgia	1,360	286	-	137	-	-	9,369	-	-	-	-

* vessel was converted in 1989

maintain their vessels in class through periodic inspection, this assists in maintaining a specified standard upkeep. Generally building and maintaining a ship in class provides evidence to insurers, charters, and prospective purchasers of the condition of a vessel. Developments at the International Maritime Organization (IMO) - the SOLAS conventions - affect the regulations of Ship Safety and the classification societies. Two particular areas are of significance for ferries:

1. Damage stability requirements
2. Structural fire protection requirements

Suffice to say that developments in these areas may necessitate the replacement or major modification of some existing vessels.

In order to illustrate some of the major characteristics of conventional vessels, Table 8.1 has been included. Vessels 1 through 7 in this table are recently constructed Western European ferries. The Western European new builds are essentially of two types; passenger/auto (#1-5), and truck ferries (6,7). Vessel number 8 is the M.V. Smallwood which was constructed at M.I.L. - Davie for Marine Atlantic. This ship was introduced to the North Sydney to Port Aux Basques crossing in 1990. Vessel number 9 is the large ferry which is now under construction in British Columbia for the Tsawwassen to Swartz Bay route. It is scheduled for delivery in 1993. Both Canadian vessels are passenger/auto designs.

The European ferry operators view ferries as a viable and competitive part of the transportation infrastructure. This is the case even in the light of fixed link competition, such as the Channel Tunnel. Commercial operators on the English Channel are investing a billion dollars in new vessels and infrastructure in order to meet the challenge of the tunnel. In the Baltic, commercial competition on the Sweden-Finland route has resulted in a similar level of investment and a new standard of ferry, with size and amenities comparable to the foremost cruise liners.

In general terms it can be seen that large conventional ferries:

- can provide significant capacities for passengers, automobiles and/or freight vehicles;
- have operating speeds of from 15 to 23 knots;
- cost in the range of $70 to $150 million Canadian;
- can be a tourist attraction in themselves (as in the trans-Baltic service);
- can provide competitive transportation services in particular markets; and
- several existing Canadian ferries may require replacement or substantial modification in the near future to meet more stringent safety requirements

8.3 Advanced High-Speed Ferries

The advanced high-speed ferry industry has come to a position of credibility in the past decade. The construction of these vessels is a billion dollar a year industry, growing at about 30% annually. There are about 400 fast ferries in service around the world today. Almost all are designed to solely carry passengers; however, there are now three car carrying ferries of the "wavepiercer" design in service, three of a "surface effect craft" design under construction and many other designs on the drawing board. Speeds of up to 50 knots (100 kilometres per hour) are possible for some of these craft. In the past few years they have developed in terms of capacity, range, seakeeping (comfort), and refinement. The following sections will present a comparison of the generic types of advanced high-speed ferries.

The general types of high-speed ferries are illustrated in Figure 8.1 and Table 8.2. The Surface Effect Ship and Hovercraft are both adaptations of the Air Cushion Vehicle principle - where the craft is supported by a cushion of air created by powerful fans. The hovercraft has the advantage of being amphibious, the surface effect ship of better power efficiency and better seakeeping in rough weather. Many hovercraft are in service with the military around the world, carrying both personnel and vehicles.

Hydrofoils are of two main types - submerged foil and surface piercing foil. The submerged foil type is more efficient and can offer better seakeeping, but is more complex because it requires an active motion control system. The Soviet Union has a large number of hydrofoils in service particularly on the river systems.

Monohulls include the conventional displacement vessel, and the planing vessel. The displacement hull is covered in the section dealing with conventional ferries. The planing hull is fairly simple to build, but lacks the speed/weight/power relationship and seakeeping of some of the other types.

The multihulls consist of several types of catamaran hulls. Catamarans may be of the slender displacement type, or of the planing type. Both can be fairly fast, but have limited seakeeping. The SWATH (small waterplane area twin hull) is particularly designed to minimize ship motions in rough seas. Because this has only a small area at the water's surface, it is affected only to a small degree by surface waves. However, to function well it normally requires an activated fin system. SWATH's may be either slow or fast, the latter at some penalty in power.

The above distinctions are now becoming blurred, for instance, there are now catamaran designs with foils. A further type, in which naval architects have been largely involved, is the WIG (wing in ground effect), which is actually a low flying aircraft. By flying in the ground effect zone (say 1/2 to 10 meters above the surface), the WIG uses only a fraction the power

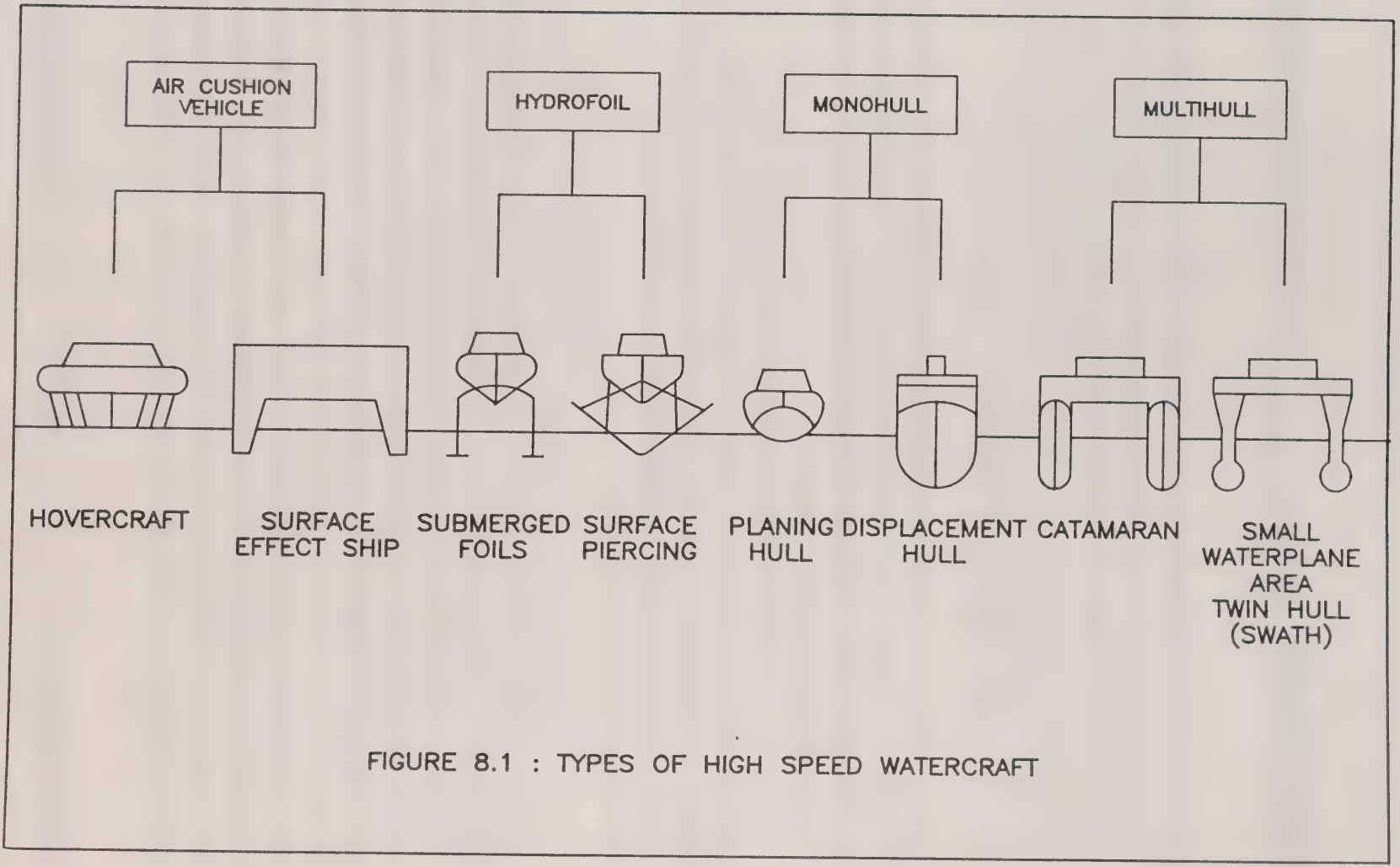


FIGURE 8.1 : TYPES OF HIGH SPEED WATERCRAFT

Table 8.2
Passenger and Passenger/Auto Fast Ferry Characteristics

Type	Name	Capacity		Dimensions in meters			Speed (KN)	Power (kW)	Propulsion	Cost (millions)
		Passengers	Auto	Length	Breadth	Draft				
Surface Effect Ship	San Paul (Ulstein)	330	-	36	11.5	0.5	45	3,600	Waterjet	$12
Surface Effect Ship (Steel, 1992)	SEC 450	450	90	73	21	3.7	59	32,000	Waterjet	$30
Hovercraft	AP1-88/1G	90	-	24.5	11	-	50	1,300	Air prop	$3
Catamaran	Fjellstand	320	-	39	9.4	1.5	31	2,800	Waterjet	$8
Swath	FBM-PATRIA	400	-	36.5	13	2.7	30	5,500	Propeller	$10
Swath (Steel)	Regency (Design)	450	124	69.4	-	-	35	30,000	Propeller	$30
Wavepiercing Catamaran (Aluminum, 1990)	Hoverspeed Great Britain	450	70	73.6	26.2	2.5	35	14,400	Waterjet	$30

of a conventional aircraft. They would generally fly over water (rivers, lakes and potentially the ocean) or over barren areas, such as tundra, at speeds of 100 to 300 kilometres per hour. WIG's may look like aircraft, or may be of radically different form. Considerable conceptual and test work, including test craft, has been done in the USA, USSR, China and Germany.

Table 8.2 gives the particulars of many of the present day types of high-speed ferries. In the past couple of years automobile carrying high-speed ferries have been successfully introduced on the English Channel and on the Bass Strait (Australia to Tasmania). In both instances they have met with very good market acceptance. Some preliminary studies of the application of high-speed ferries to Canadian East Coast services, suggest that they could provide a significant financial turnaround in comparison to a conventional ferry for certain services.

In general terms automobile carrying high-speed ferries:

- can operate in reasonable weather conditions at speeds from 30 to 60 knots
- can provide significant capacities for passengers and automobiles, but are not effective carriers of heavy commercial vehicles
- capital cost in the range $25 to $35 million Canadian
- as a rule of thumb, annual costs are generally one third capital; one third fuel; and one third everything else
- may provide significant operating and cost benefits if properly applied to the correct routes

8.4 Summary of Technical Developments

From the above discussion it is evident that a number of distinct trends are developing in the design of new ferry vessels. They are:

- An increased emphasis on amenities;
- Ferries are being designed with flexibility in mind - routes and roles may vary considerably over a vessels lifetime;
- Advanced high-speed ferries are replacing conventional vessels on some routes and new routes will likely be opened by these technically innovative vessels; and
- The design of modern ferries is affected by a variety of regulations; those regarding fire safety and damage stability may be particularly onerous.

8.5 Implications for Canadian Ferry Operations

The trends that are now underway will have the following implications for Canadian ferry operations:

- Although conventional vessels will continue to be added to certain high volume routes due to operating and traffic requirements, high speed technology will be compared for applicability in other circumstances.

- Regulations will likely have a significant effect on ferry operations in the near future. The design of new vessels will have to meet new regulations, and existing vessels may require substantial modification or replacement in order to comply. In the case of high-speed ferries, it is not clear how these vessels will be dealt with by the Canadian regulatory authorities; however it is certain that any operator planning to introduce an advanced high speed ferry will be well advised to carefully address the regulatory issues.

- Advanced high-speed ferries may offer very significant cost advantages in comparison to conventional ferries on the same service for passenger transport. In particular, their capital cost is likely half that of the conventional counterpart. In addition, their maintenance and infrastructure costs will likely be considerably less. They also may be able to earn more revenue where their speed is deemed an advantage. Where the route, weather conditions and traffic patterns permit, it may be worthwhile to compare a high-peed ferry with a conventional vessel. However, high-speed ferries appear less attractive on routes where there is a substantial requirement for the transport of vehicles. In Europe, many ferries change services several times during their lives due to changing trade patterns, or perhaps obsolescence on a high profile service. In addition, some services are seasonal, requiring the repositioning of vessels. It may be that Canadian operators should be ensured this flexibility in order to best serve the travelling public.

APPENDIX A
MARINE ATLANTIC TRAFFIC
BY SERVICE
1986-1990

Table A.1
North Sydney to Port aux Basques
Five Year Traffic Profile, 1986 – 1990

Traffic	1986	1987	1988	1989	1990	4–Yr Compound Growth Rate
Freight Traffic – Rail						
Freight Tons	88,027	50,197	23,318	0	–	–
New Vehicles	7,768	7,847	5,826	1,202	–	–
Passenger Traffic						
Passengers	304,053	325,210	356,829	384,873	362,350	4.5%
Automobiles	60,956	64,518	71,659	78,251	74,803	5.3%
Pick–up Trucks	17,316	21,520	25,336	27,037	27,284	12.0%
Auto Trailers	4,022	4,166	4,695	5,155	4,217	1.2%
Campers	3,761	4,228	4,286	3,675	3,875	0.7%
Buses	317	404	434	423	420	7.3%
Motorcycles & Bicycles	1,466	1,514	1,474	1,652	1,385	–1.4%
Total Passenger Vehicles	87,838	96,350	107,884	116,193	111,984	6.3%
Commercial						
Straight Trucks	3,394	3,536	3,916	4,339	3,827	3.0%
Tractor & Trailer	25,068	30,208	34,206	35,185	34,298	8.2%
Trailer Only	18,875	22,446	24,214	20,041	17,824	–1.4%
C.R.V. Others	161	368	392	463	189	4.1%
Total Commercial Units	47,498	56,558	62,728	60,028	56,138	4.3%
Containers						
Containers – 20 ft	5,036	3,721	2,610	1,515	866	–35.6%
Containers – 40 ft	21,353	19,373	14,301	5,890	4,152	–33.6%
Containers – Other	255	230	21	65	15	–50.8%
Total Containers	26,644	23,324	16,932	7,470	5,033	–34.1%
Miscellaneous						
Single Crossing	2,231	2,011	2,044	2,131	1,689	–
Railcars – Loaded	3,141	1,630	336	–	–	–
Railcars – Empty	3,122	1,843	302	–	–	–
Total Railcars	6,263	3,473	638	–	–	–

Table A.2
North Sydney to Argentia
Five Year Traffic Profile, 1986 – 1990

Traffic	1986	1987	1988	1989	1990	4–Yr Compound Growth Rate
Freight Traffic – Rail						
Freight Tons	–	–	–	–	–	–
New Vehicles	1	–	–	–	–	–
Passenger Traffic						
Passengers	31,082	31,296	21,146	28,026	44,486	9.4%
Automobiles	6,698	6,625	4,645	6,356	10,684	12.4%
Pick–up Trucks	1,494	1,582	1,284	1,473	2,339	11.9%
Auto Trailers	401	411	346	266	634	12.1%
Campers	546	671	420	736	1,100	19.1%
Buses	84	97	81	69	75	–2.8%
Motorcycles & Bicycles	468	451	300	392	435	–1.8%
Total Passenger Vehicles	9,691	9,837	7,076	9,292	15,267	12.0%
Commercial Traffic						
Straight Trucks	70	52	51	63	147	20.4%
Tractor & Trailer	23	20	12	22	146	58.7%
Trailer Only	0	2	3	19	77	–
C.R.V. Others	1	7	4	25	28	–
Total Commercial Units	94	81	70	129	398	43.4%
Containers						
Containers – 20 ft	–	–	–	–	–	–
Containers – 40 ft	–	–	–	–	–	–
Containers – Other	–	–	–	–	–	–
Total Containers	–	–	–	–	–	–
Miscellaneous						
Single Crossing	78	78	58	76	80	–
Railcars – Loaded	–	–	–	–	–	–
Railcars – Empty	–	–	–	–	–	–
Total Railcars	–	–	–	–	–	–

Table A.3
Cape Tormentine to Borden
Five Year Traffic Profile, 1986 – 1990

Traffic	1986	1987	1988	1989	1990	4–Yr Compound Growth Rate
Freight Traffic – Rail						
Freight Tons	174,546	98,074	36,386	25,599	–	–
New Vehicles	0	0	0	0	–	–
Passenger Traffic						
Passengers	1,662,088	1,713,110	1,777,292	1,847,317	1,791,286	1.9%
Automobiles	513,665	524,416	549,650	578,854	584,254	3.3%
Pick–up Trucks	56,748	61,201	66,729	63,842	53,251	–1.6%
Auto Trailers	19,919	19,796	20,006	20,487	18,410	–2.0%
Campers	10,481	11,785	11,979	11,827	11,694	2.8%
Buses	4,007	4,725	5,052	4,887	3,528	–3.1%
Motorcycles & Bicycles	8,387	8,034	6,803	6,689	6,189	–7.3%
Total Passenger Vehicles	613,207	629,957	660,219	686,586	677,326	2.5%
Commercial Traffic						
Straight Trucks	24,684	26,091	27,039	24,307	23,723	–1.0%
Tractor & Trailer	92,273	104,779	114,030	128,141	136,279	10.2%
Trailer Only	0	0	0	2	0	–
C.R.V. Others	185	406	338	228	458	25.4%
Total Commercial Units	117,142	131,276	141,407	152,678	160,460	8.2%
Containers						
Containers – 20 ft	–	–	–	–	–	–
Containers – 40 ft	–	–	–	–	–	–
Containers – Other	–	–	–	–	–	–
Total Containers	–	–	–	–	–	–
Miscellaneous						
Single Crossing	11,183	11,524	12,177	12,371	13,000	–
Railcars – Loaded	2,985	1,596	508	319	–	–
Railcars – Empty	2,696	1,372	493	382	–	–
Total Railcars	5,681	2,968	1,001	701	–	–

Table A.4
Saint John to Digby
Five Year Traffic Profile, 1986 – 1990

Traffic	1986	1987	1988	1989	1990	4–Yr Compound Growth Rate
Freight Traffic – Rail						
Freight Tons	–	–	–	–	–	–
New Vehicles	–	–	–	–	–	–
Passenger Traffic						
Passengers	225,414	223,062	229,112	236,326	213,667	–1.3%
Automobiles	50,849	50,587	52,371	55,921	48,856	–1.0%
Pick–up Trucks	4,917	5,466	6,492	6,177	6,116	5.6%
Auto Trailers	1,850	1,807	1,725	1,968	1,628	–3.1%
Campers	2,572	2,520	2,477	2,359	1,920	–7.0%
Buses	462	501	448	461	427	–2.0%
Motorcycles & Bicycles	1,760	2,012	1,741	1,789	1,557	–3.0%
Total Passenger Vehicles	62,410	62,893	65,254	68,675	60,504	–0.8%
Commercial Traffic						
Straight Trucks	4,061	3,712	3,780	3,667	3,327	–4.9%
Tractor & Trailer	11,248	10,851	11,648	11,193	11,025	–0.5%
Trailer Only	10,366	11,014	10,277	7,002	6,697	–10.3%
C.R.V. Others	85	42	56	76	83	–0.6%
Total Commercial Units	25,760	25,619	25,761	21,938	21,132	–4.8%
Containers						
Containers – 20 ft	–	–	–	–	–	–
Containers – 40 ft	–	–	–	–	–	–
Containers – Other	–	–	–	–	–	–
Total Containers	–	–	–	–	–	–
Miscellaneous						
Single Crossing	1,532	1,507	1,533	1,540	1,506	–
Railcars – Loaded	–	–	–	–	–	–
Railcars – Empty	–	–	–	–	–	–
Total Railcars	–	–	–	–	–	–

Table A.5
Yarmouth to Bar Harbor
Five Year Traffic Profile, 1986 – 1990

Traffic	1986	1987	1988	1989	1990	4–Yr Compound Growth Rate
Freight Traffic – Rail						
Freight Tons	–	–	–	–	–	–
New Vehicles	–	–	–	–	–	–
Passenger Traffic						
Passengers	121,915	119,163	124,012	122,914	116,067	–1.2%
Automobiles	29,458	28,024	30,429	32,211	30,532	0.9%
Pick–up Trucks	1,593	1,643	2,071	1,293	1,340	–4.2%
Auto Trailers	884	962	1,126	1,029	1,060	4.6%
Campers	1,512	1,753	1,895	1,911	1,628	1.9%
Buses	251	206	210	204	168	–9.5%
Motorcycles & Bicycles	1,997	2,148	1,779	1,932	1,583	–5.6%
Total Passenger Vehicles	35,695	34,736	37,510	38,580	36,311	0.4%
Commercial Traffic						
Straight Trucks	1,138	929	1,447	1,224	1,341	4.2%
Tractor & Trailer	2,052	2,354	2,501	2,168	1,989	–0.8%
Trailer Only	759	439	187	165	181	–30.1%
C.R.V. Others	0	0	0	0	0	–
Total Commercial Units	3,949	3,722	4,135	3,557	3,511	–2.9%
Containers						
Containers – 20 ft	–	–	–	–	–	–
Containers – 40 ft	–	–	–	–	–	–
Containers – Other	–	–	–	–	–	–
Total Containers	–	–	–	–	–	–
Miscellaneous						
Single Crossing	359	357	417	405	426	–
Railcars – Loaded	–	–	–	–	–	–
Railcars – Empty	–	–	–	–	–	–
Total Railcars	–	–	–	–	–	–

APPENDIX B

BRITISH COLUMBIA FERRY CORPORATION

TRAFFIC BY SERVICE

1986-1990

Table B.1
British Columbia Ferry Corporation
Vancouver Island/Mainland Service Area
Five Year Traffic Profile, 1986 – 1990

	Tsawwassen/Swartz Bay						Horseshoe Bay/Naniamo and Tsawwassen/Nanaimo					
Traffic	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate
Passenger Traffic												
Passengers	6,280,476	5,172,598	5,444,922	5,877,637	5,922,208	−1.5%	4,037,797	3,759,361	4,027,058	4,292,183	4,506,353	2.8%
pax veh, underheight	1,590,734	1,480,477	1,554,683	1,688,725	1,704,643	1.7%	1,184,094	1,184,869	1,283,446	1,372,341	1,430,241	4.8%
pax veh, overheight	113,320	94,932	98,219	103,210	97,325	−3.7%	121,603	113,235	121,072	138,079	141,986	4.0%
trailers, underheight	11,123	10,669	11,123	11,834	10,801	−0.7%	16,149	16,937	17,631	17,831	18,143	3.0%
trailers, overheight	15,242	13,864	14,763	15,827	14,974	−0.4%	24,290	25,024	27,402	31,323	34,176	8.9%
buses	37,607	26,631	28,801	32,592	34,104	−2.4%	10,729	8,715	8,803	9,099	9,412	−3.2%
motorcycles	22,790	19,381	16,470	17,371	16,316	−8.0%	19,619	18,396	16,439	16,563	16,327	−4.6%
bicycles	13,285	13,751	14,368	14,625	15,063	3.2%	7,810	8,662	8,894	9,495	11,477	10.1%
Total Pax Vehicles	1,804,101	1,659,705	1,738,427	1,884,184	1,893,226	1.2%	1,384,294	1,375,838	1,483,687	1,594,731	1,661,762	4.7%
Total Pax Vehicles * (in auto equivalents)	1,866,030	1,699,216	1,781,661	1,934,743	1,946,371	1.1%	1,397,942	1,384,606	1,492,399	1,603,434	1,660,930	4.4%
Commercial Traffic												
Commercial Vehicles	75,716	80,320	86,946	94,816	91,627	4.9%	73,729	85,677	92,994	99,617	101,355	8.3%
Commercial Vehicles * (in auto equivalents)	227,148	240,960	260,838	284,448	274,881	4.9%	221,187	257,031	278,982	298,851	304,065	8.3%
Total Traffic * (in auto equivalents)	2,093,178	1,940,176	2,042,499	2,219,191	2,221,252	1.5%	1,619,129	1,641,637	1,771,381	1,902,285	1,964,995	5.0%

* Buses and commercial vehicles were assumed to equal 3 autos and bicycles were not included when calculating auto equivalents.

Table B.2
British Columbia Ferry Corporation
Sunshine Coast Service Area
Five Year Traffic Profile, 1986 – 1990

	Horseshoe Bay/Langdale						Comox/Powell River					
Traffic	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate	1986/87	1987/88	1988/89	1989/90	1990/91	3–Yr Compound Growth Rate
Passenger Traffic												
Passengers	1,887,842	1,914,360	1,994,888	2,216,192	2,324,194	5.3%		261,266	270,471	282,749	288,558	3.4%
pax veh, underheight	672,454	705,250	750,486	867,468	917,252	8.1%	–	80,388	82,192	87,708	90,016	3.8%
pax veh, overheight	50,152	49,940	49,654	61,198	66,418	7.3%	–	8,466	10,113	10,601	11,084	9.4%
trailers, underheight	8,102	8,456	8,114	7,962	7,932	−0.5%	–	815	986	946	921	4.2%
trailers, overheight	7,810	7,984	7,854	9,002	8,910	3.3%	–	1,456	1,257	1,362	1,411	−1.0%
buses	3,192	3,012	3,204	3,248	3,316	1.0%	–	84	114	145	149	21.1%
motorcycles	9,674	9,902	7,994	8,418	9,652	−0.1%	–	1,535	1,309	1,260	1,326	−4.8%
bicycles	4,912	5,920	5,508	5,308	5,620	3.4%	–	1,842	1,797	1,834	1,907	1.2%
Total Pax Vehicles	756,296	790,464	832,814	962,604	1,019,100	7.7%	–	94,586	97,768	103,856	106,814	4.1%
Total Pax Vehicles * (in auto equivalents)	757,768	790,568	833,714	963,792	1,020,112	7.1%	–	92,912	96,199	102,312	105,205	4.2%
Commercial Traffic												
Commercial Vehicles	23,244	26,506	29,804	41,428	41,748	15.8%		2,776	2,853	3,373	3,643	9.5%
Commercial Vehicles * (in auto equivalents)	69,732	79,518	89,412	124,284	125,244	15.8%	–	8,328	8,559	10,119	10,929	9.5%
Total Traffic * (in auto equivalents)	827,500	870,086	923,126	1,088,076	1,145,356	8.5%	–	101,240	104,758	112,431	116,134	4.7%

* Buses and commercial vehicles were assumed to equal 3 autos and bicycles were not included when calculating auto equivalents.

Table B.3
British Columbia Ferry Corporation
Gulf Islands Service Area
Five Year Traffic Profile, 1986 – 1990

Traffic	Swartz Bay/Outer Gulf Islands						Tsawwassen/Gulf Islands					
	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate
Passenger Traffic												
Passengers	302,506	321,447	329,368	358,168	378,120	5.7%	261,260	569,623	573,460	597,776	595,595	22.8%
pax veh, underheight	129,374	136,359	143,140	161,640	172,621	7.5%	68,610	161,701	165,991	178,668	177,015	26.7%
pax veh, overheight	8,142	7,926	7,361	7,582	8,120	−0.1%	4,626	11,386	11,432	11,683	11,192	24.7%
trailers, underheight	353	363	368	451	491	8.6%	986	1,021	943	987	971	−0.4%
trailers, overheight	140	167	178	175	252	15.8%	603	552	580	636	666	2.5%
buses	34	44	29	30	62	16.2%	113	160	128	137	94	−4.5%
motorcycles	414	425	601	547	580	8.8%	877	929	673	712	665	−6.7%
bicycles	1,491	3,329	2,541	3,111	7,026	47.3%	8,455	11,432	11,276	11,347	11,720	8.5%
Total Pax Vehicles	139,948	148,613	154,218	173,536	189,152	7.8%	84,270	187,181	191,023	204,170	202,323	24.5%
Total Pax Vehicles * (in auto equivalents)	138,525	145,372	151,735	170,485	182,250	7.1%	76,041	176,069	180,003	193,097	190,791	25.9%
Commercial Traffic												
Commercial Vehicles	3,363	4,112	3,211	4,346	5,565	13.4%	818	2,143	1,978	2,430	2,502	32.2%
Commercial Vehicles * (in auto equivalents)	10,089	12,336	9,633	13,038	16,695	13.4%	2,454	6,429	5,934	7,290	7,506	32.2%
Total Traffic * (in auto equivalents)	148,614	157,708	161,368	183,523	198,945	7.6%	78,495	182,498	185,937	200,387	198,297	26.1%

* Buses and commercial vehicles were assumed to equal 3 autos and bicycles were not included when calculating auto equivalents.

Table B.4
British Columbia Ferry Corporation
Mid and North Island Service Area
Five Year Traffic Profile, 1986 – 1990

Traffic	Campbell River/Quadra Island						Nanaimo Harbour/Gabriola Island					
	1986/87	1987/88	1988/89	1989/90	1990/91	3–Yr Compound Growth Rate	1986/87	1987/88	1988/89	1989/90	1990/91	3–Yr Compound Growth Rate
Passenger Traffic												
Passengers	–	832,066	825,998	879,582	896,248	2.5%	–	676,594	703,578	755,304	800,352	5.8%
pax veh, underheight	–	309,724	319,912	334,236	335,956	2.7%	–	261,912	281,004	307,530	323,398	7.3%
pax veh, overheight	–	26,376	21,138	13,174	13,588	–19.8%	–	4,714	7,418	6,672	7,112	14.7%
trailers, underheight	–	–	210	3,604	3,628	–	–	11,668	1,372	1,606	1,556	–48.9%
trailers, overheight	–	–	52	2,236	2,468	–	–	546	484	490	654	6.2%
buses	–	115	224	288	252	29.9%	–	46	38	44	66	12.8%
motorcycles	–	–	76	2,188	2,206	–	–	5,078	3,038	2,956	3,592	–10.9%
bicycles	–	7,127	7,526	1,194	8	–89.6%	–	176	0	0	7,408	347.9%
Total Pax Vehicles	–	343,342	349,138	356,920	358,106	1.4%	–	284,140	293,354	319,298	343,786	6.6%
Total Pax Vehicles * (in auto equivalents)	–	336,445	342,060	356,302	358,602	2.1%	–	284,056	293,430	319,386	336,510	5.8%
Commercial Traffic												
Commercial Vehicles		8,486	11,979	11,204	9,734	4.7%	–	5,820	6,480	7,062	8,030	11.3%
Commercial Vehicles * (in auto equivalents)	–	25,458	35,937	33,612	29,202	4.7%	–	17,460	19,440	21,186	24,090	11.3%
Total Traffic * (in auto equivalents)	–	361,903	377,997	389,914	387,804	2.3%	–	301,516	312,870	340,572	360,600	6.1%

* Buses and commercial vehicles were assumed to equal 3 autos and bicycles were not included when calculating auto equivalents.

Table B.5
British Columbia Ferry Corporation
Mid and North Coast Service Area
Five Year Traffic Profile, 1986 – 1990

Traffic	Bear Cove/Bella Bella/Prince Rupert						Prince Rupert/Skidegate					
	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate	1986/87	1987/88	1988/89	1989/90	1990/91	4–Yr Compound Growth Rate
Passenger Traffic												
Passengers	71,670	65,015	71,662	73,671	69,226	−0.9%	35,967	39,205	42,486	43,685	44,203	5.3%
pax veh, underheight	12,876	12,110	12,664	13,147	12,562	−0.6%	8,271	9,067	9,560	9,935	10,250	5.5%
pax veh, overheight	4,010	3,743	4,002	4,007	3,938	−0.5%	2,573	2,580	2,632	2,866	2,755	1.7%
trailers, underheight	356	326	290	279	254	−8.1%	299	363	312	315	333	2.7%
trailers, overheight	449	423	432	403	386	−3.7%	420	490	444	411	361	−3.7%
buses	168	152	193	178	181	1.9%	13	4	12	13	15	3.6%
motorcycles	580	624	583	547	550	−1.3%	77	86	129	115	116	10.8%
bicycles	283	300	358	395	467	13.3%	216	300	367	431	448	20.0%
Total Pax Vehicles	18,722	17,678	18,522	18,956	18,338	−0.7%	11,869	12,890	13,456	14,086	14,278	4.7%
Total Pax Vehicles * (in auto equivalents)	18,775	17,682	18,550	18,917	18,233	−0.7%	11,679	12,598	13,113	13,681	13,860	4.4%
Commercial Traffic												
Commercial Vehicles	203	185	195	198	200	−0.4%	2,876	3,094	2,825	2,929	2,740	−1.2%
Commercial Vehicles * (in auto equivalents)	609	555	585	594	600	−0.4%	8,628	9,282	8,475	8,787	8,220	−1.2%
Total Traffic * (in auto equivalents)	19,384	18,237	19,135	19,511	18,833	−0.7%	20,307	21,880	21,588	22,468	22,080	2.1%

* Buses and commercial vehicles were assumed to equal 3 autos and bicycles were not included when calculating auto equivalents.